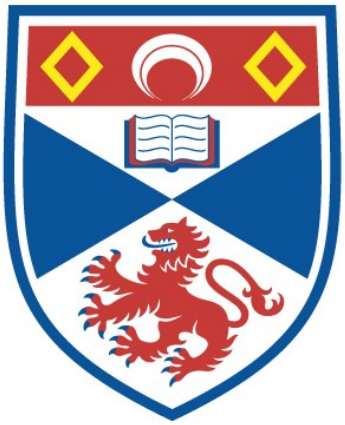
PROBLEMS OF INTERNATIONAL COOPERATION TO IMPROVE STANDARDS OF AVIATION SECURITY WITH REFERENCE TO THE PASSENGER

Robin Edward Hill

A Thesis Submitted for the Degree of PhD
at the
University of St Andrews



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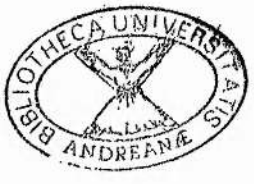

To Mary, Alex and Ailsa Hill

ABSTRACT

Crimes of violence involving civil aviation interests and airline passengers have developed and diversified since their original perpetration in the 1930s. Intergovernmental cooperative efforts to suppress the offences have largely been based upon international legal, administrative activities, with the intention of producing a near-global, standardised regime of norms concerning the apprehension, extradition, prosecution and punishment of persons responsible for acts of aviation hijacking, sabotage and airport attack. While the suppressive qualities of the regime have been demonstrated in terms of common air crimes, the internationally recognised norms have had little effect in countering the actions of fanatical offenders motivated by political aims. While concentrating upon law-based policy options premised on the notion of deterrence, governments have failed fully to recognise a pressing need for preventive activities to be improved as a principal component of crime suppression machinery. With terrorist weaponry and abilities becoming increasingly sophisticated, with most available aviation security staff and apparatus being unreliable in processes of detection and with the civil aviation market expanding rapidly, imprecise and unenforced state-imposed standards of aviation security require radical and global upgrading - an expensive and politically difficult option for most governments to consider. Proposals for intergovernmental security development schemes need urgent consideration, with passenger-financed options offering some practical solutions to otherwise potentially insoluble problems. Ultimately, prospects of advancement must depend upon the political will of major governments, which continue to regard the integrity of aviation security systems as a low priority for global standardisation.

I, Robin Edward Hill, hereby certify that this thesis, which is approximately 110,000 words in length, has been written by me, that it is the record of work carried out by me and that it has not been submitted in any previous application for a higher degree.

date 28. November 1990 signature of candidate .....

I was admitted as a research student under Ordinance No. 12 in October, 1986 and as a candidate for the degree of Doctor of Philosophy in October, 1986; the higher study for which this is a record was carried out in the University of St. Andrews between 1986 and 1990.

date 28. November 1990 signature of candidate .....

I hereby certify that the candidate has fulfilled the conditions of the Resolution and Regulations appropriate for the degree of Doctor of Philosophy in the University of St. Andrews and that the candidate is qualified to submit this thesis in application for that degree.

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The International Foundation of Airline Passengers Associations and its Executive Director, Geoffrey Lipman, were vital in assisting the project with substantial funding and a useful supply of information, contacts and opportunities. Without IFAPA's support the research would have taken much longer to complete. Without Geoffrey's wise and unique guidance on aviation policy, this thesis would not have been complete.

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LIST OF ABBREVIATIONS

AG	Aktiengesellschaft
AI	Artificial Intelligence
AMD	Archway Metal Detector
amu	atomic mass unit
AOCI	Airport Operators' Council International
AS&E	American Science and Engineering
ATA	Air Transport Association
AWG	American Wire Gauge
B747	Boeing 747
BAA	BAA plc (formerly British Airports Authority)
BBC	British Broadcasting Corporation
BIA	Bangkok International Airport
CCTV	Closed-Circuit Television
CT	Computed Tomography
DGAC	Direction Générale de l'Aviation Civile
EDEN	Equipment de Détection d'Explosifs par Neutrons
EDS	Explosive Detection System
ETC	Explosives Technical Commission
FAA	Federal Aviation Administration
FAR	False Alarm Rate
FNA	Fast Neutron Activation
GAO	General Accounting Office
GmbH	Gesellschaft mit beschränkter Haftung
HED	Hydrogenous Explosive Detection
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ID	Identification
IED	Improvised Explosive Device
IFALPA	International Federation of Air Line Pilots Associations
IFAPA	International Foundation of Airline Passengers Associations
ILO	International Labour Organization
IOCU	International Organization of Consumer Unions
IRNA	Islamic Republic News Agency
ITN	Independent Television News
ITV	Indepedent Television
KUNA	Kuwaiti News Agency
LDC	Less Developed Country
OAS	Organization of American States
PFLP	Popular Front for the Liberation of Palestine
PFLP-GC	Popular Front for the Liberation of Palestine - General Command
PLO	Palestine Liberation Organization
SAIC	Science Applications International Corporation
SARPs	Standards and Recommended Practices
SODERN	Société d'Études et Réalisations Nucléaires
TNA	Thermal Neutron Activation/Analysis
TNT	Trinitrotoluene
TREVI	Terrorism, Radicalism, Extremism and International Violence

UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
US	United States
USA	United States of America
USSR	Union of Soviet Socialist Republics
WPC	Woman Police Constable

CHAPTER 1

INTRODUCTION

> "What is at stake is the protection of human beings, the sovereignty of states, the safety of international traffic and an international order free from violence."[1]

> "Terrorism directed against civil aviation is the single most serious problem facing the industry today."[2]

1.1. Introductory Comments on the Research Programme

This research was undertaken between October 1986 and November 1990 at the Universities of Aberdeen and (from October 1989) St. Andrews, under the expert supervision of Professor Paul Wilkinson. The subject, the prevention of crimes of violence against aviation with particular reference to offences against airline passengers, proved at first difficult to research because of the reluctance of authorities and individuals to divulge information regarding security norms, subscribing to the widespread but unconvincing idea that "precautions can only be precautions so long as nothing is said about them.".[3] As increasingly distressing and needless acts of violence took place, however, a greater interest in the research was engendered, with valuable material being received from within the industry and found in the media.[4]

The library services of the Universities of Aberdeen, St. Andrews, Glasgow and Dundee provided much useful research material, while the British Library Document Supply Centre's excellent Inter-Library Loan system was invaluable for providing obscure legal and technical texts. Many international organisations and institutions provided unique research information, with certain individuals supplying (often at

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[1] H.D. Genscher, 28 September 1976, quoted in H. Steelman, "International Terrorism vis-a-vis Air-Hijacking," *Southwestern University Law Review* 9 (1977), p. 110.

[2] G.O. Eser, Director-General of the International Air Transport Association, November 1986, quoted in G. Norton, "Tourism and International Terrorism," *The World Today* 43/2 (1987), p. 31.

[3] Lufthansa spokesman, Stefan Hilscher, quoted in *The German Tribune*, 22 January 1989, p. 14.

[4] In particular, the eventual willingness of security technology firms to supply reports of their systems' performance, academic papers and news report reprints must acknowledged.

their own expense) a great deal of unusual documentation. The bibliography at the end of the thesis conceals the generosity of many persons.

During the course of research, the current writer was privileged to be able to attend several international conferences on air law, aviation security and terrorism in the Netherlands, Switzerland, the United Kingdom, Canada, Sweden and France, on two occasions representing the International Foundation of Airline Passengers Associations at the European Civil Aviation Conference's Working Group on Security Matters. The meetings of the Working Group were completely confidential, so that no attempt could be made in this thesis to include any element of deliberations made during closed sessions. Nevertheless, discussions and interviews with fellow representatives from European and north American states and from the industry proved to be very useful in broadening perspectives on the problems faced in the civil aviation industry.

1.2. Thesis Topic

This thesis concerns problems of international cooperation to improve standards of aviation security with reference to the passenger. In deciding upon a research topic, three factors were foremost in the current writer's mind. First, it was deemed necessary to find a well-documented field of research which could provide adequate materials to consult yet on which could be built an original and useful thesis. While much existing literature describes the development and contents of the suppression regime regarding violent air crime, there are few recently written texts which analyse its continuing and evolving weaknesses. As a result, scope was identified for producing a work which extended upon previous legal writings with analysis of practical, preventive means of crime suppression. Second, a keen interest in public international law, international organisation, terrorism and air policy determined that any research should revolve around the general area of air crime, which has long occupied the attention of various intergovernmental agencies. Third, the active involvement in the project of the International Foundation of Airline Passengers Associations (IFAPA) ensured that travellers' concerns and interests would easily be promoted and that discussion of the vast field of aviation security would be limited largely to questions of preventive activity as they relate to airline passengers and their baggage. These factors combined to form the basis of the research.

The result of the studies undertaken over four years is this thesis, which can be divided into three thematic categories. The initial thrust of the thesis (contained in Chapter 2) seeks to establish that governments' diplomatic efforts to suppress crimes of violence against aviation and its users have failed to constrain the activities of ideologically motivated offenders. Of particular interest is the case study of the Kuwait Airways Flight 422 hijacking incident of April 1988 (assessed in Chapter 3) which also acts as an introduction to the theme of airport security - the second theme of the thesis. Detailing the changing security needs of the industry, Chapters 4 to 7 discuss the history of aviation security, the new threats facing the industry from well-equipped and able terrorists, the search for advanced means of countering such dangers and means of implementing adequate standards of airport security throughout a diversely characterised industry. The thesis' final area of interest (found in

Chapter 8) concerns organisational measures which require to be taken to facilitate changes in security on a global scale. Throughout the work, it is stressed that progress tends to be slow and erratic on account of reluctance among states and certain sectors of the industry to take the politically complex and financially expensive steps required for appropriate reform.

1.3. Defining the Boundaries of Violent Air Crime With Reference to the Passenger

The civil aviation industry is different from all others in the types of serious offences which can be committed against persons associated with it. In particular, the tendency for aviation interests to be targeted because of their associations with particular states or regions must be considered carefully in any discussion of the phenomena involved. In terms of violent air crime, three distinct offence categories can be identified which are of key interest to scholars of political violence and international relations. These are the crimes of unlawful diversion of aircraft (commonly referred to as "hijacking"); sabotage of aviation interests, with particular reference to aircraft in flight; and attacks against airports and their users. These categories will each be considered immediately below.

1.3.1. Hijacking

The offence commonly termed "aircraft hijacking" has been described concisely by Evans in the following way:

> "the diversion of an aircraft from its scheduled destination by force or threat thereof."[5]

Boyle correctly observes that "most hijackings have been derived from the changing social and political climates of various areas of the world".[6] Boyle's remark, however, should not prompt the notion that all acts of hijacking - or, indeed, of violent air crime generally - must involve an overtly political motivation.[7] McWhinney has expertly outlined the different hijacking trends which have been observed since the late 1940s, grouping the principal types as "east-west" political escapes, "lunatic fringe" hijackings (most with some variety of Cuban involvement) from the early 1960s, profit-oriented diversions which he terms "skyjackings", and "privileged combatancy" acts, classically

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[5] A.E. Evans, in A.E. Evans and J.F. Murphy, *Legal Aspects of International Terrorism* (Lexington: Heath, 1978), p. 3.

[6] R.P. Boyle, "International Action to Combat Aircraft Hijacking," *Lawyer of the Americas* 4 (1972), p. 461.

[7] L.Z. Freedman and Y. Alexander (eds.), *Perspectives on Terrorism* (Wilmington: Scholarly Resources, 1983), p. 3.

associated with Palestinian hijackings.[8]

Several writers have adopted similar classifications in an attempt to categorise the principal forms of offender into readily identifiable motivational groups, such as disgruntled nationals, "flying commandoes", mentally deranged, common criminals and extortionists;[9] insane persons, mercenaries, political representatives and freelance revolutionaries;[10] refugees, criminals, mentally deranged and criminal groups;[11] and asylum seekers, felonious escapees, the mentally defective, criminal extortionists and ideological or political terrorists.[12] It should be clear that a major difficulty facing policy makers concerned with combating these acts is that the term "hijacking" only barely serves to cover a broad range of very different offences. In the words of McWhinney:

> "Our conclusion must be that so far from being one simple, comprehensive problem, aerial hijacking reduces, on examination, to a series of different problems, involving widely different personality profiles or professional backgrounds on the part of the main actors; widely different personal or political motivations on the part of those actors; and, finally, widely different choices of means and techniques for effectuating their intention on the part of the actors, depending in part upon their relative intelligence and technological sophistication and in part upon the immediate results desired to be achieved."[13]

A general impression of the changing rate of development of hijacking

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[8] E. McWhinney, *Aerial Piracy and International Law* (Dordrecht: Nijhoff, 1987), pp. 8 - 13. One recent indicator of a possible trend is to be found in an interview given by the Soviet Deputy Minister of Civil Aviation, Mikhail Timofeyev, in which it was confirmed that the Soviet state carrier, Aeroflot, had suffered over 70 hijacking attempts in its history, with a remarkable thirteen attempts being made in a seven week period from early June to late July 1990. *Soviet Weekly*, 25 July 1990, reprinted in Novosti Press Agency press release, July 1990. For other information on trends see C.J. Visser, *Civil Aviation Remains Vulnerable to Terrorism* (Arlington: Flight Safety Foundation, 1988), p. 4.

[9] A. Abramovsky, "The Constitutionality of the Anti-hijacking Security System," *Buffalo Law Review* 22 (1972/73), p. 126.

[10] D.A. Baldwin, "Bargaining with Airline Hijackers," in W.I. Zartman (ed.) *The Fifty Percent Solution* (London: Yale University Press, 1976), p. 405.

[11] C. Dudley, "Hijacking and Terrorist Attacks Against Aircraft and Airport Installations," *Journal of the Insurance Institute of London* 65 (1976 - 77), p. 66.

[12] S.B. Rosenfield, "Air Piracy: Is it Time to Relax our Security?" *New England Law Review* 9 (1973), pp. 88 - 90.

[13] McWhinney (1987), p. 14.

can be obtained by reference to recorded data on its incidence:[14]

TABLE 1.1.

AIR CARRIER HIJACKINGS WORLDWIDE, 1931 - 1988

YEAR	NUMBER OF HIJACKINGS
1931	1
1932 - 1946	0
1947	1
1948	7
1949	6
1950	4
1951	1
1952	2
1953	1
1954 - 1955	0
1956	1
1957	0
1958	8
1959	6
1960	9
1961	11
1962	3
1963	1
1964	2
1965	5
1966	4
1967	6
1968	35
1969	87
1970	83
1971	58
1972	62
1973	22
1974	26
1975	25
1976	18
1977	31
1978	25
1979	23
1980	38
1981	29
1982	30
1983	33
1984	26
1985	26
1986	13
1987	13
1988	15
TOTAL	797

[14]US Department of Transportation, Federal Aviation Administration, *Worldwide Significant Criminal Acts Involving Civil Aviation,* 1980 - 1985; and *Criminal Acts Involving Civil Aviation,* 1986 - 1988.

Current trends appear to indicate that aircraft hijackings are diminishing in number, although some serious cases have occurred, in defiance of global trends. Although it may, occasionally, be possible to characterise a particular incident in terms of a given classification, it is not possible to draw adequate statistical conclusions from the information available. One reason for this is the uncertainty of available data, as even the best published statistics do not claim to be comprehensive. Another factor involves the inability to determine precisely the nature of each hijacking and the motivations and aims of each offender. Nevertheless, if recent data covering January 1980 to December 1988 are analysed, it is possible to group hijackings according to their very general purposes or characteristics.[15] Incidents may be classified according to:

1) a predominant political motivation, which includes demands for political or religious publicity, constitutional reform, prisoner or hostage releases, funds for political causes and guerilla or mercenary transport;[16]

2) certain transportational demands, such as instructions to divert an aircraft to or from, for example, Cuba, the Soviet Bloc, the People's Republic of China, war zones and prisons;

3) their predominant cause being one of private extortion or theft;

4) the perpetrators' unstable mental state or delusion; and

5) remaining unknown characteristics.

Taking these loose groupings, the following table of incidents can be produced to characterise the 256 hijackings and serious attempts at hijacking civil aircraft which have occurred during the period under investigation:

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[15]Data are drawn from US Federal Aviation Administration, *Worldwide Significant Criminal Acts Involving Civil Aviation,* 1980 - 1985; and *Criminal Acts Involving Civil Aviation,* 1986 - 1988.

[16]This category of political hijackings therefore includes the particularly dangerous and difficult grouping of terrorist aircraft diversions.

TABLE 1.2.

HIJACKINGS AND ATTEMPTS FROM 1 JANUARY 1980 - 31 DECEMBER 1988 GROUPED BY MAJOR CAUSE

YEAR (19)	80	81	82	83	84	85	86	87	88	TOTAL
MAJOR CAUSE										
Political	7	13	9	3	9	13	4	3	2	63
Transportational	21	9	20	29	17	10	10	7	9	132
Private extortion	4	1	0	0	1	0	0	0	1	7
Mental factors	1	0	0	0	2	5	3	2	3	16
Unknown factors	5	5	4	4	1	7	4	6	2	38
TOTAL	38	28	33	36	30	35	21	18	17	256

Clearly, although transportationally-motivated hijackings constitute the greatest current diversion threat to aviation, there remains a notable, though apparently small and declining, risk of hijackings being perpetrated for political reasons of various types. As shall be demonstrated, the decline in the incidence of political hijackings has been accompanied by an increase in the use of in-flight sabotage.

1.3.2. Sabotage

Reference to any comprehensive listing of hijacking incidents reveals that while occasional acts of political hijacking (such as the Kuwait Airways siege, discussed below) still occur, a decline has taken place in most forms of reported acts of diversion from the mid 1970s to the present day.[17] No attempt is made here to explain in detail the reasons for this decline, except to note that such factors as heightened aviation security and improved domestic and international legal responses probably each contributed to a reduction in incidence. As the tables below reveal, however, the decline in political hijackings throughout the 1980s has been accompanied by an increase in the number and effectiveness of sabotage incidents - now an almost purely terrorist mode of attack.[18]

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[17] Note, however, the increase in refugee escape hijackings from the Soviet Union to western states from the late 1980s onwards. Novosti Press Agency news release quoted from *Izvestia*, 25 July 1990.

[18] Sources of data in tables: US Federal Aviation Administration data to 31/12/88 (listed in bibliography) and news reports to 07/12/89. Examples concern only civil aircraft in service and do not include cases in which explosive devices were infiltrated for the purpose of transit. Also excluded are instances of, or attempts at, destruction by external attack, internal gunfire and violence during hijackings.

Table 1.3.

CHRONOLOGY OF FATAL IN-SERVICE CIVIL AIRCRAFT SABOTAGE INCIDENTS, 7 MAY 1949 - 27 NOVEMBER 1989[19]

DATE	AIRLINE AND AIRCRAFT	DEATHS	RANK
07/05/49	Philippine Airlines DC-3	13	29E
09/09/49	Quebec Airways (Canada) DC-3	23	24
11/04/55	Air India Constellation	16	26E
01/11/55	United Air Lines (US) DC-6B	44	16
25/07/57	Western Airlines (US) CV-240	1	34E
08/09/59	Mexicana DC-3	1	34E
06/01/60	National Airlines (US) DC-6B	34	18
28/04/60	Linea Aeropostal Venezolana DC-3	13	29E
22/05/62	Continental (US) B-707	45	15
08/12/64	Alas Airlines (Bolivia) C-47	15	28
08/07/65	Canadian Pacific Airlines DC-6B	52	13
22/11/66	Aden Airways DC-3	28	21
12/10/67	British European Airways Comet 4B	66	11
05/08/69	Philippines Airlines HS 748	1	34E
22/12/69	Air Vietnam (South Vietnam) DC-6B	32	19
21/02/70	Swiss Air Coronado	47	14
21/04/70	Philippine Airlines HS 748	36	17
02/06/70	Philippine Airlines Fokker F-27	1	34E
20/11/71	China Airways (Taiwan) Caravelle	25	23
26/01/72	Jugoslavenska Aerotransport DC-9	27	22
15/06/72	Cathay Pacific Airways (HK) CV-880	81	9
19/03/73	Air Vietnam (South Vietnam) DC-4	59	12
17/12/73	Pan American (US) B-707	30	20
08/09/74	Trans World Airlines (US) B-707	88	7
03/06/75	Philippine Airlines BAC-111	1	34E
01/01/76	Middle East Airlines (Lebanon) B-720	82	8
06/10/76	Cubana DC-8	73	10
24/05/78	General Aviation (Kenya) Piper Aztec	4	30E
18/08/78	Philippine Airlines BAC-111	1	34E
13/10/81	Air Malta B-737	2	33
11/08/82	Pan American (US) B-747	1	34E
23/09/83	Gulf Air (Bahrain) B-737	112	5
23/01/85	Lloyd Aereo Boliviano B-727	1	34E
23/06/85	Air India B-747	329	1
02/04/86	Trans World Airlines (US) B-727	4	31E
08/05/86	Air Lanka (Sri Lanka) L-1011	16	26E
29/11/87	Korean Air (South Korea) B-707	115	4
01/03/88	BOP Air (South Africa) Bandeirante	17	25
21/12/88	Pan American (US) B-747	259	2
20/09/89	UTA (France) DC-10	170	3
27/11/89	Avianca (Colombia) B-727	107	6

These data reveal not only the current development of a worrying trend

[19] In column four of this table, the heading "Rank" refers to the rating by death toll of each offence detailed. Hence, the Air India incident of 23 June 1985 is ranked "1" to denote that it involved the highest number of fatalities of any act of aviation sabotage to date. The letter "E" is used to signify an equal ranking with another or other incident(s).

towards the greater use of sabotage tactics by air offenders, but also suggests that in cases of sabotage of aircraft in service in which fatalities have been recorded, terrorists are becoming much more able to kill efficiently. Note that of the above examples the five top ranking incidents (by fatality) have occurred since 1983. The almost constant advance of the death toll created by sabotage bombings in civilian aircraft is reproduced by decade in the table below. Note in particular, the sudden rise in deaths per incident in the 1980s.

TABLE 1.4.

DEATHS/FATAL SABOTAGE INCIDENTS, 1949 - 1989

DECADE	FATAL INCIDENTS	DEATHS	DEATHS/INCIDENTS
1949	2	36	18.00
1950-59	4	62	15.50
1960-69	9	286	31.78
1970-79	14	555	39.64
1980-89	12	1133	94.42
TOTAL	41	2072	50.54

Further indications that a sabotage crisis has developed are to be found in a statistical analysis of all sabotage-related offences documented throughout the 1980s. The table below, compiled from several sources, demonstrates that although few tragedies on the scale of the Air India or Pan Am disasters have taken place, an average of over two bomb explosions per year was recorded during the decade and that, on average, almost five serious offences involving explosives and aircraft have occurred annually.

TABLE 1.5.

AVIATION SABOTAGE OFFENCES, 1980-89

Fatal explosions on board aircraft	12
Non-fatal explosions on board aircraft	9
Devices placed on board aircraft (no explosion)	15
Devices intended for aircraft (explosion in airport)	7
Serious attempts	5
Conspiracy	1
TOTAL	49

1.3.3. Airport Attack

From existing data,[20] serious acts of violence at airports which have actually taken place (rather than those which may be contemplated) can be classified into two major and often compatible methodological types: attacks using explosive or incendiary devices, and those which employ firearms. In the former case, an aim of the offender may be to inflict structural damage upon the airport or upon its facilities or aircraft, or to kill or injure possibly large numbers of passengers, visitors and personnel circulating throughout the buildings. In the case of purely terrorist attacks the primary objective will normally be to make a violent political gesture in a well known public place of international and commercial significance, where persons of many nationalities are likely to be present, so being brought into the conflict waged by the terrorist against a state or against the international order as a whole. Whatever the motivation may be, an accompanying aim will often be to attract media coverage to the incident, either to highlight a stated cause or to draw attention to some unstated but circumstantially obvious grievance connected with either the state on which the airport is located or the state of carriers operating therein.

Airport bombings are usually characterised by their obvious political nature, differing in form from many firearms incidents which are not restricted in any sense to acts of terror violence. This is particularly true in states which operate libertarian gun laws, so making it easier for their citizens to carry arms. Clearly, however, the most obvious and pressing danger in dealing with firearms cases at airports must relate to attack by terrorists - an horrific possibility for most airport terminals and entrance halls, not simply because of their normally high passenger density and nationally identifiable check-in desks at which often long queues of travellers stand grouped together, but also because access from outside a terminal to its hubs of activity are typically unimpeded by security measures. Together with architectural trends of recent decades which often result in major airports being based on open-plan models, these features allow terrorists to make swift entry, locate a suitable target and carry out their crimes without security forces present being able to make timeous or adequate response.[21]

Another means of classifying airport attack types is by degree of involvement of the offender. It is obvious that a grenade or gun attack taking place in the heart of an airport terminal poses a very different threat from an explosion caused by a device located in a piece of baggage apparently waiting for retrieval at a carousel or in a public locker. The danger of a bomb placed in a litter bin or under a seat requires a set of preventive and responsive activities which will differ from those needed to answer the threats from letter bomb, mortar attack or non-fissile nuclear contamination. The history of airport attacks has illustrated that, irrespective of security measures taken, the airport has remained an important target type. The complexities and expense entailed in introducing security measures

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[20] FAA statistics (listed in bibliography).

[21] Visser (1988), p. 8.

to public buildings of high transitory population turnover ensure that it can only be a difficult and costly task to make airports an unattractive venue for terrorist attack. Coupled with this is the fact that anti-hijacking measures at airports have slightly reduced the dangers of in-flight crimes but have also served to pass the burden of threat to targets which represent weaker links in the security chain, such as airports and airline ticket offices, so making them prime targets for terrorists.

Related problems concern the inability of even the most successful and well-developed of airports to preclude the possibility of attack. With other varieties of air crime there is a danger of incidents increasing in third world countries where a lack of finance impedes the fullest applicable introduction of aviation security provision, and in smaller, provincial airports which are less well protected. With acts of violence at airports, however, more sites than those which the public might predict to be prime targets (for example, Beirut, Athens and Cairo) are in fact in the front line of illegal violence. The following table, the data of which are incomplete and concern only cases of airport bombings, is taken from an ICAO Working Paper and casts light on the problem in a survey covering thirteen years between 1973 to 1985:

TABLE 1.6.

ACTS OF AIRPORT VIOLENCE, 1973 - 1985

YEAR	NUMBER OF INCIDENTS	LOCATION
1973	3	Calvi; Athens; Rome
1974	2	Heathrow; Los Angeles
1975	2	Orly; La Guardia
1976	4	Tel Aviv; Delhi; Beirut; Ajaccio
1979	2	Frankfurt
1981	2	Collingwood; Cairo
1982	2	Miami; Los Angeles
1983	2	Narita; Orly
1984	2	Kabul; Beirut
1985	4	Frankfurt; Vienna; Rome; Narita[22]

As so many advanced nations' airports have been sites of serious criminal violence in recent years it is evident that domestic and international measures to counteract the threats are insufficient for the purpose and that awareness of the dangers involved has not been heightened to a level which would prompt concerned agencies to meet the current crisis with workable solutions. It may be that governments and aviation authorities are prepared to see an "acceptable" level of killing and destruction at the world's airports in return for the very considerable savings in time, money and effort which would be required to diminish the problem by developing and introducing high technology physical security procedures. The same argument could easily be used to justify failing to secure vulnerable but nationally identifiable airline ticket offices, attacks against which constitute the most common single category of reported violent

[22] *ICAO Working Paper A26 - WP/41*, p. 2.

air crime.[23]

1.3.4. Political Factors in the Offences

It has already been stated that the offence of hijacking can be committed for a variety of reasons. Equally, other types of violent air crime can be used for different purposes, ranging from common murder and extortion to publicity-seeking and vandalism. In the forthcoming discussion, the category of general offence type which will be of greatest interest will be that which is motivated by political factors, in which an act is undertaken with the specific aim of coercing, intimidating or otherwise challenging a political power. More than any other form of offence, this type can truly be described as "aviation terrorism" because it displays an intention to present overtly violent, political opposition to interests representing or associated with constitutional powers, such as national carriers, international airports, etc. It would be impossible to present a detailed history of terrorist activities in a thesis of this length. Instead, the following table, drawn from various statistical sources, is provided to indicate some of the most important political examples which have occurred in recent years. Should further information be needed, press accounts of the incidents may be easily obtained from archives.

TABLE 1.7.

POLITICALLY-MOTIVATED ACTS OF VIOLENT AIR CRIME, 1968 - 1989

DATE	TARGET	INCIDENT TYPE
23/07/68	El Al B-707	Hijacking
05/08/69	Philippine HS 748	Sabotage
29/08/69	TWA B-707	Hijacking
22/12/69	Air Vietnam DC-6B	Sabotage
21/02/70	Swissair Coronado	Sabotage
21/02/70	Austrian Caravelle	Sabotage
21/04/70	Philippine HS 748	Sabotage
06/09/70	TWA B-707	Hijacking/Destruction
06/09/70	Swissair DC-8	Hijacking/Destruction
06/09/70	Pan American B-747	Hijacking/Destruction
06/09/70	El Al B-707	Hijacking
09/09/70	BOAC VC10	Hijacking/Destruction
20/11/71	China Airways Caravelle	Sabotage
26/01/72	JAT DC-9	Sabotage
08/05/72	Sabena B-707	Hijacking
30/05/72	Lod Airport	Airport Attack
15/06/72	Cathay Pacific CV-880	Sabotage
29/10/72	Lufthansa B-727	Hijacking
19/03/73	Air Vietnam DC-4	Sabotage
20/07/73	JAL B-747	Hijacking/Destruction
25/11/73	KLM B-747	Hijacking
17/12/73	Rome Airport	Airport Attack
17/12/73	Pan American B-707	Sabotage

[23] FAA statistics (listed in bibliography). See W. Sater, "The Terrorist Threat to Travellers," *TVI Report* 6(4) (1986) pp. 21 - 22.

17/12/73	Lufthansa B-737	Hijacking
08/09/74	TWA B-707	Sabotage
22/11/74	British Airways VC 10	Hijacking
27/06/76	Air France A-300	Hijacking
28/09/77	JAL DC-8	Hijacking
13/10/77	Lufthansa B-737	Hijacking
12/01/79	Tunis Air B-727	Hijacking
16/01/79	MEA B-707	Hijacking
07/09/79	Alitalia DC-8	Hijacking
14/01/80	Alitalia DC-9	Hijacking
18/01/80	MEA B-720	Hijacking
28/01/80	MEA B-720	Hijacking
31/01/80	Air France	Hijacking
10/03/80	MEA B-707	Hijacking
02/03/81	PIA B-720	Hijacking
27/03/81	SAHSA B-737	Hijacking
28/03/81	Garuda DC-9	Hijacking
24/05/81	Turkish DC-9	Hijacking
29/09/81	Indian B-737	Hijacking
26/11/81	Air India B-707	Hijacking
07/12/81	Libyan B-727	Hijacking
07/12/81	Avensa B-727	Hijacking
07/12/81	Aeropostal DC-9 (1)	Hijacking
07/12/81	Aeropostal DC-9 (2)	Hijacking
24/02/82	Kuwait B-707	Hijacking
26/02/82	Air Tanzania B-737	Hijacking
28/04/82	ANHSA Dash-7	Hijacking
04/08/82	Indian B-737	Hijacking
20/08/82	Indian	Hijacking
22/06/83	Libyan B-707	Hijacking
06/07/83	Iran Air B-747	Hijacking
15/07/83	Paris Orly Airport	Bombing
27/08/83	Air France B-727	Hijacking
23/09/83	Gulf Air B-737	Sabotage
10/03/84	UTA DC-8	Sabotage
05/07/84	Indian Airbus	Hijacking
31/07/84	Air France B-737	Hijacking/Destruction
24/08/84	Indian B-737	Hijacking
05/11/84	Saudi L-1011	Hijacking
24/11/84	Somali B-707	Hijacking
04/12/84	Kuwait Airbus	Hijacking
11/06/85	Alia B-727	Hijacking
14/06/85	TWA B-727	Hijacking
23/06/85	Air India B-747	Sabotage
23/06/85	Tokyo Airport	Airport Attack/Attempted Sabotage
23/11/85	Egyptar B-727	Hijacking/Destruction
27/12/85	Rome Airport	Airport Attack
27/12/85	Vienna Airport	Airport Attack
02/04/86	TWA B-727	Sabotage
17/04/86	El Al B-747	Attempted Sabotage
08/05/86	Air Lanka L-1011	Sabotage
05/09/86	Pan American B-747	Hijacking/Destruction
14/09/86	Seoul Airport	Bombing
25/12/86	Iraqi B-737	Hijacking/Destruction
24/07/87	Air Afrique DC-10	Hijacking
11/11/87	Beirut Airport	Bombing
29/11/87	Korean B-707	Sabotage
01/03/88	BOP Air Bandeirante	Sabotage

05/04/88	Kuwait B-747	Hijacking
21/12/88	Pan American B-747	Sabotage
20/09/89	UTA DC-10	Sabotage
27/11/89	Avianca B-727	Sabotage

1.4. Literature Review

Many sources exist to analyse the derivation and history of aviation violence and trends which have occurred in its development.[24] A very large number of descriptive and largely uncritical writings have been devoted in whole or in part to discussing the contents of the various agreements made since the early 1960s.[25] A few writings have ventured into a more critical analysis of the treaty law and the international

[24] Boyle (1972), p. 461; W.A. Crenshaw, "Terrorism and the Threat to Civil Aviation" (Ph.D. diss., University of Miami, 1987) pp. 31 - 60; J.T. Dailey, "Skyjacking: Problems and Potential Solutions - A Symposium - Development of a Behavioral Profile for Air Pirates," *Villanova Law Review* 18 (1973), pp. 1004 - 1008; Dudley (1976 - 77), pp. 74 - 79; R.A. Friedlander, "Banishing Fear from the Skies: A Stautory Proposal." *Duquesne Law Review* 16 (1977 - 78).

[25] C.N. Brower, "Skyjacking: Problems and Potential Solutions - A Symposium - International Enforcement of Air Security - United States' Initiatives," *Villanova Law Review* 18 (1973); H.G. Dawson, "Civil Aviation, Hijacking and International Terrorism - An Historical and Legal Review" (New York: International Bar Association, 1986) photocopied; H.G. Dawson, "Hijacking and the Law," *Solicitors' Journal* 130 (1986); Y. Dinstein, "Criminal Jurisdiction over Aircraft Hijacking," *Israel Law Review* (1972); C. Emanuelli, "Legal Aspects of Aviation Terrorism: The Piecemeal vs. the Comprehensive Approach," *Journal of International Law and Economics* 10 (1975); S.Z. Feller, "Comment on Criminal Jurisdiction over Aircraft Hijacking," *Israel Law Review* 7 (1972); R.L. Fick, J.I. Gordon and J.C. Patterson, "Aircraft Hijacking: Criminal and Civil Aspects," *University of Florida Law Review* 22 (1969), pp. 86 - 90; M.E. Fingerman, "Skyjacking and the Bonn Declaration of 1978: Sanctions Applicable to Recalcitrant Nations." *California Western International Law Journal* (1980); R. Hirano, "Convention on Offences and Certain Other Acts Committed on Board Aircraft of 1963," *University of Tasmania Law Review* 8 (1964), p. 44; G.L. Hughes, "The Law in Australia Relating to the Unlawful Seizure of Aircraft," *University of Tasmania Law Review* 6 (1978), pp. 49 - 56; R.F. Klimak, "International Law - Convention on Offenses and Certain Other Acts Committed on Board Aircraft - The Tokyo Convention," *De Paul Law Review* 20 (1971); A.I. Mendelsohn, "In-Flight Crime: The International and Domestic Picture under the Tokyo Convention," *Virginia Law Review* 53 (1967); C. November, "Aircraft Piracy: The Hague Hijacking Convention," *International Lawyer* 6 (1972); J.M. Sharp, "Canada and the Hijacking of Aircraft," *Manitoba Law Journal* 5 (1973), pp. 454 - 458; Steelman (1978), pp. 99 - 104; O.M. Trelles II, "International Law and Aircraft Hijacking," *New Zealand Law Journal* 4 April 1978, pp. 118 - 122; F.M. Troncoso Cortés, "Conventions on Unlawful Interference with Aircraft ("Pirateria Aeria") a Hard Line," *Revista del Colegio de Abogados de Puerto Rico* 34 (1973), pp. 545 - 563.

legislative efforts to date.[26] The legislative development of the international legal regime is also quite well documented, with a few notable commentators having passed comment on its evolution.[27]

In the practical field of aviation security, very little of depth and of current interest to the student of international affairs is to be found in the public domain. Published textbooks understandably and correctly tend to dwell on the vital but mundane questions associated with day to day low budget airport management, at the expense of broader political considerations of threat and response.[28] The few books and articles which have been written on security policy interests are normally slightly outdated, dealing as they do with matters about which little background information is available and

[26] A. Abramovsky, "Multilateral Conventions for the Suppression of Unlawful Seizure and Interference with Aircraft. Part I: The Hague Convention," *Columbia Journal of Transnational Law* 13 (1974); A. Abramovsky, "Multilateral Conventions for the Suppression of Unlawful Seizure and Interference with Aircraft. Part II: The Montreal Convention," *Columbia Journal of Transnational Law* 14 (1975); A. Abramovsky, "Multilateral Conventions for the Suppression of Unlawful Seizure and Interference with Aircraft. Part III: The Legality and Political Feasibility of a Multilateral Air Security Enforcement Convention." *Columbia Journal of Transnational Law* 14 (1975); B. Cheng, "The Hague Convention on Hijacking of Aircraft 1970 - The Legal Aspects," *Aeronautical Journal* 76 (1972); B. Cheng in B. Cheng and E.D. Brown (eds.), "Aviation, Criminal Jurisdiction and Terrorism: The Hague Extradition Prosecution Formula and Attacks at Airports." *Contemporary Problems in International Law: Essays in Honour of Georg Schwarzenburger on his Eightieth Birthday* (London: Stevens, 1988), p. 25; G.F. FitzGerald, "Recent Proposals for Concerted Action Against States in Respect of Unlawful Interference with International Civil Aviation," *Journal of Air Law and Commerce* 40 (1974); R.J. McGrane, "A Search for an International Solution to the Problem of Aircraft Hijacking," *Auckland University Law Review* 2 (1975); E. McWhinney, *Aerial Piracy and International Law* (Leiden: Siithoff, 1971); McWhinney (1987); A. Samuels, "The Legal Problems: An Introduction," *Journal of Air Law and Commerce* 37 (1971); W. Schwenk, "The Bonn Declaration on Hijacking," *Annals of Air and Space Law* 4 (1980).

[27] R.P. Boyle, "Jurisdiction over Crimes Committed in Flight: An International Convention," *American Criminal Law Quarterly* 3 (1964 - 65), pp. 69 - 71; Cheng, (1972); J.J. Lambert, *Terrorism and Hostages in International Law* (Cambridge: Grotius, 1990).

[28] F.C. Dorey, *Aviation Security* (London: Granada, 1983); K.C. Moore, *Airport, Aircraft and Airline Security* (Los Angeles: Security World Cpublishing Co., 1976).

which concern fast-changing issues of technology.[29]

More practical information can be found by referring to the standards and guides produced by states and international organisations. The US Federal Aviation Administration (FAA) supplies generous amounts of useful background material on the nature of US security systems and statistics on security lapses worldwide. Much interesting information can also be gathered from the British House of Commons Select Committee on Transport's reports on airport security, of which there have been two since 1986.[30] Most recently, the US President's Commission Report on Aviation Security and Terrorism provided in 1990 a valuable, if selectively-critical, analysis of the most difficult security weaknesses.[31]

The United Nations' Specialised Agency for aviation, the International Civil Aviation Organization (ICAO) produces Standards and Recommended Practices (SARPs) on security contained in an annex to its constituent document, the Convention on International Civil Aviation, known as the Chicago Convention, 1944.[32] Annex 17, entitled *Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference*, which entered force on 15 July 1974 and has since undergone several periodic reviews, was designed to encourage ICAO's global membership to adhere to a list of minimum norms on security, an objective which resulted in highly diluted, general and lenient standards being framed.[33] For this reason, the Annex cannot be

[29]F. Brenchley, "Living with Terrorism: The Problem of Air Piracy." *Conflict Studies* No. 184 (1986). See *ICAO Bulletin* for regular short articles on security issues. For a contemporary approach to the subject see R. Clutterbuck, *Terrorism and Guerrilla Warfare: Forecasts and Remedies* (London: Routledge, 1990); R. Clutterbuck, *Terrorism, Drugs and Crime in Europe After 1992* (London: Routeledge, 1990). Also of great interest is A. Lewis and M. Kaplan, *Terror in the Skies - Aviation Security* Proceedings of the First International Seminar on Aviation Security (Jerusalem: International Seminar on Aviation Security, 1990).

[30]House of Commons Committee on Transport, *Fourth Report from the Transport Committee, Session 1985 - 86, Airport Security*. (London: HMSO, 1986); and House of Commons Committee on Transport, *Third Report from the Transport Committee, Session 1988 - 89, Airport Security*. (London: HMSO, 1989). See also British Government, *Government Response to the Fourth Report of the Committee, Session 1985 - 86*. (Edinburgh: HMSO, 1986).

[31]President's Commission on Aviation Security and Terrorism, *Report of the President's Commission on Aviation Security and Terrorism*. (Washington D.C.: Government Printing Office, 1990).

[32]Convention on International Civil Aviation, 7 December 1944, Chicago. 15 UNTS; UKTS 8 (1953), Cmd 8742; 148 BFSP 38; TIAS 1591; 61 Stat (2) 1180; 3 Bevans 944; SATS 20 (1968); JOF 3 Jun 47; 10 Vert A 96; 39 AJIL Supp 111; 45 ILD 349; 15 Ruster 7397; 1 Churchill 11; 5 Peaslee 390. Entered into force 4 April 1947.

[33]Dawson (1986) II, p. 32.

regarded as being a particularly important vehicle for security enhancement, far less a useful or detailed guide to the extent of security preparedness throughout the world. Indeed, even as a supposedly global standard, the Annex is unable to offer anything more than the most simple and vague exhortations, resulting in each state party to the document employing its own national security programme in isolation, rather than as part of a unified global system.[34] The US President's Commission was in no doubt concerning the status of Annex 17:

> "Currently, there is no uniform international civil aviation security system in place to assure a consistent level of security for passengers. Many nations have adopted the standards of the International Civil Aviation Organization (ICAO), a U.N. body, which recommends standards and practices for aviation security. However, the ICAO standards prescribe a very basic or low level of security that is inadequate for high threat international airports. ICAO lacks any oversight authority or ability to impose sanctions for noncompliance."[35]

More detailed and sensitive information regarding the technicalities of security is believed to be found in the ICAO *Security Manual for the Prevention of Unlawful Acts against Civil Aviation*, a document closely guarded from public view by the Organization. Fearing that terrorists could take advantage of the details contained in the handbook, ICAO has always limited its circulation to its member states, apparently unaware that by so doing terrorists will gain access to its secrets through state sponsors.[36] This simple problem illustrates the greater difficulty continually faced by ICAO in having in its membership nations which have not always adhered to the highest ideals of state conduct with respect to aviation.

1.5. The Implications of Violent Air Crime

The use of violence against aviation is undertaken often to attack a national interest of a state, sometimes with the intention of discouraging passengers from using certain or all flight services. The economic implications of such activity should not be underestimated. After the TWA hijacking of June 1985, a financial shock wave passed through the industry - in 1986 more than 40,000 US citizens cancelled flight reservations to European capitals - a major downturn from previous figures.[37] Indeed, by the summer of 1986

[34] *Condé Nast Traveler*, March 1989, p. 32.

[35] President's Commission (1990), p. 27.

[36] Note that a similar handbook on security activities in western Europe is published and freely available. European Civil Aviation Conference, *Manual of ECAC Recommendations and Resolutions Relating to Facilitation and Security Matters*. (Paris: European Civil Aviation Conference, September 1988).

[37] A.J. Goodpaster *et al.*, *Combatting International Terrorism: U.S. - Allied Cooperation and Political Will*. (Washington D.C.: Atlantic Council of the United States, 1986) p. 38.

surveys of passenger trends had revealed that travellers' bookings from the United States to Europe had declined by between 30 and 80 per cent, depending on destination.[38] An OECD study has also revealed that aviation terrorism has been at least partially responsible for tourism declining in target states by as much as 35 or 42 per cent.[39]

It is interesting to note that some state responses to security lapses are implemented with the intention of inflicting economic injury on other nations. A good example of this is the public warnings issued in June 1986 by the US Administration to travellers intending to use Athens airport. This protest against lax security was made in order to accelerate Greek security reform activities through the imposition of economic pressures. Security was raised to a tolerable standard by July 1986 and the public notices were withdrawn, but only after an estimated $300 million (US) of tourist revenues had been lost to Greece.[40]

In addition to governments, the subject of aviation crime should be of pressing and direct interest to the industry itself. This was demonstrated in the wake of the widely publicised terrorist bombing of a US carrier's aircraft over the Scottish town of Lockerbie on 21 December 1988. In May 1990, Pan American World Airways announced that the Lockerbie disaster's undermining of public confidence had resulted in losses totalling almost $250 million (US).[41] With an act of sabotage permitted by negligent security resulting in the loss of an aircraft worth in excess of that figure and in the possibility of legal action to reclaim damages far in excess of such a sum, carriers and authorities should be aware that the very financial existence of some actors in civil aviation may in future depend on scrupulous adherence to high standards of security.[42] At the very least, the

[38] *Plane Facts*, June/July 1986, p. 2. The US Travel Data Center revealed that, following the above-noted TWA incident, 850,000 US reservations for overseas flights were cancelled and another 220,000 were altered to domestic flights, out of a total of 6.5 million. Norton (1987), p. 31.

[39] T.J.C. Joy, *Aviation Security (Management Aspects): Government National and Regulatory Viewpoint*. Unpublished paper presented at International Aviation Management Training Institute Conference on Aviation Law and its Impact on Management, Bali, Indonesia, 10 May 1990.

[40] Cheng in Cheng and Brown (eds.) (1988), pp. 51 - 52. For a detailed discussion of terrorism's impact on international tourism see H. Handszuh in Lewis and Kaplan (eds.) (1990), pp. 70 - 71; and R. Bar-On in Lewis and Kaplan (eds.) (1990), pp. 83 - 103.

[41] *The Independent*, Saturday 12 May 1990, p. 2.

[42] F.R.J. Laity, *Aviation Security (Management Aspects)*. Unpublished paper presented at International Aviation Management Training Institute Conference on Aviation Law and its Impact on Management, Bali, Indonesia, 10 May 1990; M.H. MacKenzie-Orr, "Aviation Security in an Age of Terrorism," *Flight Safety Digest* (December 1988) p. 5.

cost-conscious industry should realise that the containment of terrorism can also bring with it the containment of insurance costs and incident administration expenses.[43]

Paradoxically, while the consequences of hijacking, aircraft sabotage and airport attacks can be devastating and can pose major economic problems, it is also tempting to over-emphasise the importance of violent air crime. Without wishing to trivialise, it is necessary to state that in terms of human loss, air crime has never been a major numerical killer. Indeed, even in 1985 (so far the year with the highest air crime mortality figures) 473 persons were killed in acts of violent air crime and a further 375 were injured, throughout the world.[44] In the same year in England and Wales alone, a total of 590,734 fatalities occurred, the table below outlining some statistics on common causes of violent deaths:[45]

TABLE 1.8.

SOME MAJOR VIOLENT CAUSES OF DEATH IN ENGLAND AND WALES, 1985

CAUSE OF DEATH	FATALITIES
Motor Vehicle Accidents	4832
Accidental Falls	3907
All Other Accidents and Adverse Effects	3743
Suicide and Self Inflicted Injury	4419
Homicide and Injury Purposely Inflicted by Persons	344
Other Violence	1764
TOTAL	19009

Even when compared with the above figures for a very small percentage of the world's population, the global statistics on death attributable to violent air crime seem insignificant. Yet, as with data on homicide (the smallest figure in the above table) their true meaning is to be found in their criminal nature. Irrespective of economic considerations, violent crimes deserve to be opposed on purely legal grounds. As serious offences against society and against innocent airline passengers and crews, air crimes require to be taken seriously

[43]For information on air crime, insurance and uninsurable liabilities, see Dudley (1976 - 77), pp. 87 - 93. See also McGrane (1975), p. 83; H.J. Iglarsh, "Fear of Flying: Its Economic Costs," *Terrorism* 10 (1987), p. 45.

[44]Dawson (1986) II, p. 1.

[45]*Demographic Yearbook 1987* (New York: United Nations, 1989), p. 500.

- a lesson which should have been learned after the destruction of Pan Am Flight 103, which constituted the most serious act of mass murder ever to have been investigated in Scottish legal history. From the viewpoint of the airline industry also, homicidal killings have become much more than an economic nuisance. Since the mid-1980s, approximately one third of all deaths and serious injuries occurring in civil aviation have been attributed to violent air crime, which thus constitutes the industry's greatest cause of death.[46] No further justification need be forwarded for examining this phenomenon.

1.6. Aviation Security - Delineating a Field of Interest

Aviation security comprises the range of techniques employed in maintaining the rights of aviation users and employees and of the general public to be safe from aviation offences, aviation-related acts of violence and consequences of such offences and acts. As terrorist threats to aviation are diverse, unpredictable and adaptable, it is necessary for the activities covered by the heading of aviation security to be wide-ranging, variable and flexible. Moreover, it would be wrong to leave room for suggestion that any particular form of security activity can enjoy a definitive application against all modes of assault.

Rather, aviation security must rely upon an extremely broad range of activities for its sure operation. In addition to the high-visibility security activities which travellers notice at many airports prior to departure, many different forms and administrative levels of activity unseen to the passenger must combine to produce an integrated network of communication and control from intergovernmental strata to the operational sector, at all times bearing in mind the essential truth that the "most crucial of all weapons in the struggle against terrorists is good intelligence on their activites."[47] The low quality of current multilateral intelligence integration can be determined from such incidents of negligence as the international fiasco over the warnings of attack prior to the Pan Am flight 103 disaster.[48]

At the international level, intergovernmental cooperation will continually be required on such vital areas as intelligence cooperation, risk assessment, integration of police, military and industry initiatives, promotion of research into the phenomena involved and development of strategies to counter aviation violence. The inability of US and western European police, security and intelligence bodies to share vital pieces of information regarding possible threats to aviation before the Pan Am Flight 103 tragedy highlights the need for improved channels of communication to be opened between and within governmental agencies. Because of the

[46] Joy (1990).

[47] Brenchley (1986), p. 3.

[48] On the theme of passenger warnings, little can be added to the excellent discussion contained in the *Report* of the President's Commission on Aviation Security and Terrorism, pp. 83 - 95. See also *The Daily Telegraph*, Wednesday 16 May 1990.

political delicacy of this area, progress in it is almost bound to be painfully slow and a subject for narrowly defined, long term projects.

At the level of the state, it is crucial for a lead agency to be appointed by government to promote the interests of aviation security, to act as the central channel of communication for security matters within the state and to promulgate clear and enforceable norms for the operation of the activities. In the United Kingdom, interest in security is divided as much by accident as by design among several bodies, with the Department of Transport notionally being in command. It would make more sense for such delicate intelligence and state security matters to be in the exclusive (or near-exclusive) domain of an agency better equipped to take appropriate initiatives in the field. Giving control to interior ministries would seem a useful partial solution to states' intelligence coordination difficulties, as it would permit the subject area to be treated as a matter of policing or of internal security, rather than as an adjunct to transport policy.

At operational levels within airports, it is vital to set in place managerial systems of control which can assess and channel security and intelligence information received and use it to maximum effect. For this to be facilitated, it is also necessary to deploy sufficient numbers of trained and highly motivated personnel, equipped with the tools and skills required to meet the needs of an industry facing the threats of attack by dedicated and intelligent terrorists. Only by presenting aviation security as a network of interdependent activities, can an accurate representation be created of the ideal to which it aspires. Similarly, only by recognising that imperfections within one level of communication or control are sufficient to jeopardise the effectiveness of the whole, can a true impression of civil aviation security's vulnerability be gained.

It is obvious that it would be impossible to discuss in detail the infinite variety of activities and lapses which can be imagined involving aviation security. Clearly, some means of narrowing this field of interest is required at this stage. This thesis is, in large part, directed at analysing political violence which directly affects airline passengers and the measures which can be taken to control such violence. For this reason, it is appropriate to limit the scope of the Chapters concerned with security issues to a discussion of airport security as it most fundamentally relates to passengers, with particular reference to the security screening techniques which are currently being developed and which have received little critical appraisal. This stress is not intended to imply that cooperative, organisational, administrative and other activities are in any sense mere additions to an overridingly important theme of passenger screening, for they are themselves central to the question of terrorism suppression. Rather, the necessary delineation of scope is drawn so as to include within it areas of keen passenger interest which can be identified as requiring specially urgent consideration.

CHAPTER 2

INTERNATIONAL ATTEMPTS AT THE SUPPRESSION OF VIOLENT AIR CRIME

> "Nowadays it is fashionable to speak of the international community, as if there does exist some sense or spirit of community among States. But what we have in reality, especially on the international level, is essentially a conglomerate of egoistic entities which each considers its own national interests as supreme. In fact, where does one find a politician who will be so bold as to place the interests of other countries first? And in case we become indignant or too complacent, one should ask the question how many of us would vote for politicians who consistently profess to subordinate national interests to allegedly world interests? But what is worse, States are often so preoccupied with their own little internal problems, including not the least electoral or popularity problems, or are so lacking in sophistication in the subject in question that it is an extremely difficult and slow process trying to persuade them to agree even to international rules and procedures that are ultimately in their own interest. What one must do in this area is, therefore, to bear in mind these political and international realities, both in our assessment of what has already been done and in what we are hoping to achieve."[1]

> "The idea of prohibitory legislation as a cure-all, or even a limiting element against terrorist actions, is itself dubious."[2]

2.1. Introduction

This Chapter concerns the legal issues surrounding violent air crime, which are discussed in order to illustrate the general thrust of intergovernmental suppression activity which has taken place since the early 1960s. The international community has achieved a considerable amount in its creation of an almost global regime covering the administration of post-incident legal activity, with particular emphasis having been placed on detention, extradition, prosecution and punishment of air offenders. Throughout this Chapter it is the intention to illustrate that the law-based achievements of three decades have proved unable to suppress all dangers posed by hijacking, sabotage of aircraft and airport attack. While the promulgation of

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[1] B. Cheng in P.M.J. Mendes de Leon and T.L. Zwaan, (eds.), *Aviation Security* (conference proceedings) (Leyden: International Institute of Air and Space Law, 1987) p. 24.

[2] I.R. Horowitz, "Can Democracy Cope with Terrorism?" *Civil Liberties Review* 4 (1977), p. 31.

criminal law norms is always a necessary step in the quest for ordered society, it is correct to note that penal standards can never alone be expected to suffice as a complete deterrent to prospective offenders.[3]

2.2. Criminal Jurisdiction

Any detailed discussion of criminal air law must involve issues of international activity, not least because many of the offences entailed can take place between two or more states. In such circumstances jurisdictional problems can easily become apparent, threatening the success of legal activities and so posing major questions for nations intent on bringing offenders to justice. Criminal jurisdiction can be briefly summed up as the ability of any sovereign state to take legal action against persons suspected of having breached a criminal law. Shubber has accumulated a fine selection of definitions of the term from notable legal authorities, which together present a clear indication of its nuances.[4] Among the more useful contributions presented by Shubber is Jennings' confident statement of the nature of jurisdiction:

> "The first principle of jurisdiction is that every State is competent to punish crimes committed upon its territory. This rule requires no authority to support it; it is everywhere regarded as of primary importance and of fundamental character."[5]

This contention is entirely fair, as it is well established that sovereign nations can legislate and enforce criminal laws for their own territories without fear of external interference in legal processes. Mann took the subject of competence in jurisdiction one step further in his useful comment on the implications of the term:

> "When public international lawyers pose the problem of jurisdiction, they have in mind the State's right under international law to regulate conduct in matters not exclusively of domestic concern."[6]

Hence, criminal jurisdiction becomes an issue of some interest and possible debate when it relates to matters of competing concern to more than one sovereign power. Equally, it can raise legal questions where no state appears able to exercise powers over suspected offenders with, at best, only tenuous links to the state in question.

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[3] Dawson (1986) I, p. 736. For an interesting discussion of deterrence as a legal concept, see M.C. Bassiouni, "Prolegomen to Terror Violence," *Creighton Law Review* 12 (1979) p. 771.

[4] S. Shubber, *Jurisdiction Over Crimes on Board Aircraft,* (The Hague: Martinus Nijhoff, 1973) pp. 48 - 56.

[5] R.Y. Jennings, "Extra-territorial Jurisdiction and the United States Anti-trust Laws," 33 *British Year Book of International Law,* (1957) p. 148, quoted in S. Shubber (1973) II, p. 50.

[6] F.A. Mann, "The Doctrine of Jurisdiction in International Law." 111 *Recueil des Cours de L'Académie de Droit International,* (1959) pp. 181 - 2, quoted in Shubber (1973) II, p. 49.

One early practical example of this is to be found in the English case of *R.* v. *Keyn,* in which the court was forced to decide whether or not an appellant should originally have been brought to trial for an offence committed neither on British territory nor on a British vessel. In determining that there were no grounds for such a prosecution, Cockburn C.J. noted:

> "Now, no proposition of law can be more incontestable or more universally admitted than that, according to the general law of nations, a foreigner, though criminally responsible to the law of a nation not his own for acts done by him while within the limits of its territory, cannot be made responsible to its law for acts done beyond such limits."[7]

In the absence of express legislation to the contrary, no determination of criminal liability should have been possible. Of course, nothing would prevent liberal promulgation of statute laws from forming a jurisdictional regime sufficiently broad to permit, for example, a court in state A convicting a person from state B of having committed a criminal offence in state C against a citizen of state D.[8] The majority ruling in the case of *The Lotus* (1927) made clear that states enjoy "a wide measure of discretion"[9] in extending their criminal jurisdiction beyond their physical boundaries:

> "Though it is true that in all systems of law the principle of the territorial character of criminal law is fundamental, it is equally true that all or nearly all these systems of law extend their action to offences committed outside the territory of the State which adopts them, and they do so in ways which vary from State to State. The territoriality of criminal law, therefore, is not an absolute principle of international law and by no means coincides with territorial sovereignty."[10]

Notwithstanding the permissive approach taken by the ruling in *The Lotus,* in practice a state's criminal legal system will almost always require for its operation some practical connection between the state in which it operates and the allegedly criminal actions of any person

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[7]Cockburn, C.J. in *R.* v. *Keyn,* (1876) 2 EX. D., p. 160, in Shubber (1973) II, p. 55.

[8]Sundberg has commented that the jurisdictional rights established by and for Sweden and Norway are particularly broad. J.W.F. Sundberg, "Piracy: Air and Sea," *De Paul Law Review* 20 (1971) p. 395.

[9]Permanent Court of International Justice, (1927) A 10, p. 19, cited in B. Cheng, "Crimes on Board Aircraft," *Current Legal Problems* 12 (1959), p. 185.

[10]Permanent Court of International Justice, (1927) A 10, p. 20, cited in Cheng (1959), p. 184.

brought for trial before a court within that state.[11] Bases of jurisdiction have thus developed, according to which prosecutions may be unambiguously premised on certain linkages between the suspect, the victim and/or the locus of the offence.[12] In international practice, these bases evolved gradually, emerging in states' legal philosophies in different ways and at different times. One common feature of all jurisdictional bases, however, was that their development had been unable to predict the rapid creation of a new, unprecedented and unique operating environment - namely the skies.[13]

The remarkably rapid development of international civil aviation in the twentieth century brought with it a major legal problem for states which had grown accustomed to traditional jurisdictional bases' operating characteristics. With legal systems almost depending upon gradual evolution over centuries (as had taken place with many of the standards in the corpus of maritime law) most nations were completely unarmed to deal with a new and unfortunately unexpected species of violent activity, as nothing had alerted states to the possibility of crimes on board aircraft engaged in international flights.[14] Cheng's influential, early work in this field, dating from 1959, provides many useful insights into the difficulties then being discovered.[15] Of special interest, he commented on two cases of the period, *USA v. Cordova and Santano*, from 1950[16] and *R. v. Martin and Others*, from six years later.[17]

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[11] S.Z. Feller, in M.C. Bassiouni and V.P. Nanda (eds.), *A Treatise on International Criminal Law* Vol. 2, (Springfield: Charles C. Thomas, 1973) p. 13.

[12] For a full discussion of jurisdictional bases see M.C. Bassiouni, *International Extradition and World Public Order* (Leyden: Sijthoff, 1974), pp. 205 - 270; Feller in Bassiouni and Nanda (eds.) (1973) Vol. 2, pp. 17 - 34; J. Gaynes, "Bringing the Terrorist to Justice: A Domestic Law Approach," *Cornell International Law Journal* 2 (1978), pp. 75 - 80; Mendelsohn (1967), pp. 511 - 513.

[13] J. Fenston and H. De Saussure, "Conflict in the Competence and Jurisdiction of Courts of Different States to Deal with Crimes Committed on Board Aircraft and the Persons Involved Therein," *McGill Law Journal* 1 (1952), p. 66; R. Wilberforce, "Crime in Aircraft," *Journal of the Royal Aeronautical Society* 67 (1963), p. 175.

[14] McWhinney (1987), p. 78.

[15] Cheng (1959), p. 177.

[16] (1950) U.S.Av.R. 1; 3 Avi 17,306, in Cheng (1959), p. 177. See also M.J. Foley, "The Anti-Hijacking Act of 1974 - A Step Beyond the Hague Convention," *South Texas Law Journal* 48 (1975), p. 357; and A.W. Knauth, "Crime in the High Air - A Footnote to History," *Tulane Law Review* 25 (1951), p. 446.

[17] [1956] 2 Q.B. 272.

Cordova and Santano were two male passengers flying on a US-registered aircraft to New York from Puerto Rico one day in 1948. Over the high seas (and so outwith the airspace of any state) the men disagreed over the question of a missing bottle of rum. In the argument, they became violent and Cordova bit both the pilot and a stewardess. Upon landing, the men were charged with assault before the District Court of the Eastern District of New York. Despite the certainty of the facts and the large number of witnesses who had seen the incident, the case was dismissed because it was discovered that the court had no jurisdiction in the matter. The prosecution had maintained that US legislation outlawing crimes committed "on board American vessels on high seas" could cover the facts of the case: however it was noted that as the alleged assaults had occurred neither on a vessel nor on the seas (being instead in an aircraft over the high seas) and as no other statute existed conferring jurisdiction, the prosecution could not proceed.

The US Congress was not slow in recognising the dangers involved in their aircraft being oases of lawlessness when flying over the high seas. In 1952, legislation was passed extending criminal jurisdiction beyond traditional territorial limits to encompass international flights.[18] In theory, had the legal loophole not been corrected, even such serious offences as mass murder over the high seas could not have been prosecuted. It is, perhaps, interesting to note that the US legislature acted to rectify the problem only after a US-registered aircraft was involved in an in-flight incident. This illustrates the reactive approach to air crime so often taken by governments.

Another problem for many states involved the impossibility of prosecution even where sufficient statutory authority for jurisdiction existed, because it is necessary to prosecute an alleged offender under a relevant criminal law. In the case of Martin (the facts of which were broadly similar to those of Cordova and Santano) jurisdiction was not at issue, because the British Government had previously extended its criminal laws to its aircraft in flight. As Cheng commented, the problem facing the English court concerned the geographical extent of the specific legislation under which the prosecution had been raised:

> "In *Martin's* case the court would have had jurisdiction had there been a rule of substantive law making the act complained of a criminal offence. But since the law invoked by the prosecution was held not applicable to events on board a British aircraft outside Britain, there was in law no offence and the defendants were set free."[19]

These two cases together demonstrate the extent of the legal *lacuna* which widely existed with regard to aviation as recently as the 1950s.

2.3. International Legal Initiatives

Until the early 1960s, no globally-based multilateral approach had

[18] US Public Law 514, July 12, 1952.

[19] Cheng (1959), p. 178.

been taken to crimes of air violence. As the incidence and severity of such acts escalated in the 1950s - the offence of hijacking evolving from an infrequent and simple means of escape for common fugitives to a more regular, criminally motivated form of diversion - it became apparent that what few national laws covered the offences were gravely inadequate for containing the dangerous new threats posed. A *lacuna* in the criminal law of many states soon became apparent on account of hijacking's originality as an offence. In the worst of cases, jurisdictional and custodial problems admitted the possibility of no municipal law applying to a case.[20] While certain grounds for asserting jurisdiction were sometimes clearly applicable, others were of uncertain validity internationally on account of jurisdictional incompatibilities between states of differing legal traditions. Also, many states took, as they continue to take, an implacable view of hijackers as political offenders or simply as refugees fleeing tyranny. To circumvent these international inconsistencies of practice, states and scholars turned to existing forms of international law in the hope of finding easily adaptable norms.

2.4. Piracy Jure Gentium

The novelty of hijacking and of the resultant inconsistencies of state practice on the issue meant that customary international law was ill-equipped to deem the offence an international crime. Such a categorisation would have resulted in the offence being treated in a similar way to such crimes as piracy, slavery and genocide. Had its characteristics corresponded sufficiently to those of piracy *jure gentium*, many of the jurisdictional problems encountered could have been avoided by allowing any state to arrest, prosecute and punish hijackers on the basis of universal jurisdiction. It is now settled, however, that the two offences cannot be equated.[21] The customary international law of piracy was codified in the Geneva Convention on the High Seas 1958, which can be applied to acts of piracy involving aircraft. However, the pertinent Articles, Articles 14 - 22, concern a crime which bears little resemblance to hijacking in its common forms.

Under Article 15 (1) piracy must be committed for "private ends". Politically motivated aircraft seizures, as well as those perpetrated by the insane, fall outwith this category. Secondly, Article 15 (1) (b) states that piratical acts take place "outside the jurisdiction of any State". As Joyner has noted, hijacking is a "continuous wrong" and as such should be regarded as having been committed within the airspace of at least the state in which the seized aircraft lands,

[20] S. Shubber, "Aircraft Hijacking Under the Hague Convention 1970 - A New Regime?" *International and Comparative Law Quarterly*, 22 (1973), p. 725.

[21] S. Shubber, "Is Hijacking of Aircraft Piracy in International Law?" *British Yearbook of International Law*, 43 (1968/69), p. 204; H.F. Van Panhuys, "Aircraft Hijacking and International Law," *Columbia Journal of Transnational Law* 9 (1970) pp. 4 - 12; S.F. Wurfel, "Aircraft Piracy - Crime or Fun?" *William and Mary Law Review* 10 (1969), pp. 841 - 842.

even if the decisive act of seizure takes place over the high seas.[22] Thirdly, with certain exceptions, Article 15 (1) (a) establishes that the act of piracy must commence on one ship or aircraft and be directed against another. This criterion could conceivably be met in an act of hijacking but no instances of it are recorded in air crime statistics.

This definition of piracy cannot accommodate the characteristics of unlawful seizure of aircraft.[23] Hijacking, therefore, continued to require the attention of the international community which, since the early 1960s has attempted to use the legislative mechanism of the multilateral convention to create bases for universalised jurisdiction in which the community of nations could voice its confidence and which the norms concerning piracy *jure gentium* could not provide. A global agreement could equate the jurisdictional properties of hijacking to those of piracy, as any state could elect to detain and prosecute any alleged offender captured within its territory.[24] It is important to note, however, that such jurisdiction would represent merely a discretionary right for states and so the introduction of conventional jurisdiction could not, of itself, mandate action by states.[25]

2.5. The Convention on Offences and Certain Other Acts Committed on Board Aircraft, 1963

In formulating air law agreements with the potential for global application, the forum of ICAO has been used to some effect.[26] Its first attempt at controlling the crime of hijacking is to be found in the Convention on Offences and Certain Other Acts Committed on Board Aircraft, known as the Tokyo Convention 1963.[27] On account of the novelty involved in drafting a treaty to deal with air crime, the Tokyo Convention was greeted with rather more enthusiasm than its

[22] N.D. Joyner, *Aerial Hijacking as an International Crime* (Leyden: Sijthoff, 1974), p. 114.

[23] November (1972), p. 643.

[24] Abramovsky, Part II, (1975), pp. 228 - 229.

[25] Shubber (1973) II, p. 701.

[26] For information on the structure and organisation of work of ICAO see T. Buergenthal, *Law-Making in the International Civil Aviation Organization* (Syracuse: Syracuse University Press, 1969); and M. Sassella, "The International Civil Aviation Organization: Its Contribution to International Law," *Melbourne University Law Review* 8 (1971).

[27] Convention on Offences and Certain Other acts Committed on Board Aircraft, 14 September 1963, Tokyo, 704 UNTS 219; 1963 UNJYB 136; UKTS 126 (1969) Cmnd 4230; 20 UST 2941; TIAS 6768; ATS 14 (1970); JOF 27 Feb 1971; 1971 RTAF 12; 37 Vert A 495; 2 ILM 1042; 58 AJIL 566; 75 RGDIP 289. Entered into force on 4 December 1969. By 1989 133 states had signed the agreement. For a discussion of the history of the proposals which were eventually enacted in the Tokyo Convention see Boyle (1964 - 65), pp. 68 -71.

provisions deserved. In fact, it soon proved to be "distinctly mild in its provisions."[28]

The modest aim of the agreement was to ensure that for any given offence or violent act taking place on board an aircraft in flight, at least one state - the state of registration of the aircraft - would be empowered to exercise criminal jurisdiction. In addition, it sought to provide for in-flight remedial action to be undertaken, to establish international recognition of aircraft commanders' rights to control activities in flight and to mandate the timely continuation of affected journeys.[29] The inherent pre-occupation with vital questions of jurisdiction and treatment of offenders would later develop to characterise the rationale of all ICAO air crime Conventions, sadly at the expense of other equally important factors which might readily have been considered.[30] In securing a right to exercise criminal jurisdiction over the offence in the state of registration of the aircraft, Article 3 of the Convention at least managed to impose a degree of order in an otherwise lawless situation by stating that "the State of registration of the aircraft is competent to exercise jurisdiction over offences and acts committed on board."[31]

The development of the Tokyo Convention cannot be regarded as anything more than a codification of pre-existing customary international law norms in an effort to concretise previously amorphous obligations, because it would be ludicrous to suggest that the advent of the agreement bestowed on states any rights which had not already been available to them in their domestic activities. The Convention merely acted to set out common ground upon which all states participating at the Tokyo Conference had agreed.[32]

It is fair to conclude that the important sections of the Tokyo Convention are either ineffective, on account of their restrictiveness, or are merely declaratory of existing norms.[33] Any of its unequivocal or novel provisions are of only secondary significance to the Convention's impact on the acts with which it is supposed to deal, such as the rules of Chapter III on the powers of the aircraft commander. Hence, the Tokyo Convention accomplishes

[28] Brenchley (1986), p. 10.

[29] Steelman (1977), p. 100.

[30] A. Abramovsky and P.L. Greene, "Unilateral Intervention on Behalf of Hijacked American Nationals Held Abroad," *Utah Law Review* (1979), pp. 237 - 8.

[31] Tokyo Convention Article 3(1). On the powers of pilots and the duties of states, see Chapter III of the Tokyo Convention.

[32] Lissitzyn, "Hijacking, International Law and Human Rights" in McWhinney (1971), pp. 117 - 8.

[33] Cheng observes that the rights outlined in Article 3 (2) already existed irrespective of the Convention and can be utilised irrespective of the treaty. Cheng in Cheng and Brown (eds.) (1989), p. 33.

little other than its formation of basic rules for in-flight control. It fails to deal with the hijacker or his illegal activities, defining no offences or penalties and providing only a minimal system of discretionary rights (and few effective mandatory obligations) in custodial and jurisdictional matters.

Seeking universal support and trusting that sovereign states would act with an element of respect for the spirit of the Convention, it seemed both expedient and sufficient to limit the extent of States' obligations and leave provisions open to a large measure of state discretion. This naïve intention was undermined, however, by two practices emerging in the late 1960s. First, western European countries consistently granted political asylum to refugees escaping political suppression in the Soviet bloc. Second, certain states extended this policy to cover political offenders - a more controversial action which would involve granting political asylum to common criminals with no legitimate political justification for any claim of sanctuary. Contraventions of Article 11 by states seeking to detain aircraft and their inhabitants for political purposes (as, for example with Algeria in 1968) further highlighted the inadequacies of the Convention in its inability to enforce the standards it sought to introduce on a global scale.

For these reasons, the Tokyo Convention cannot be viewed as a serious attempt to deter hijackers or to prevent their acts. Inhibited by domestic political and legislative difficulties, particularly in implementing Chapters IV and V on the unlawful seizure of aircraft and the powers and duties of states,[34] by a general lack of urgency towards the problem and by a growing awareness that a viable solution was not to be found in such a nominal instrument, states were slow to enact the Convention. As a result of this, it entered into force some six years after its completion, the cause of its eventual implementation being a worldwide upsurge in hijackings of all types - political, transportational and extortionist - only serving to emphasise the inadequacies of the Tokyo Convention. As shall be demonstrated, subsequent agreements made little progress upon the original Convention's internal conflict between providing effective solutions and seeking universal support.

In light of the Tokyo Convention's failure to meet the threat of hijacking, efforts shifted from facilitating a safe continuation of interrupted flights to more positively combating the perpetrators of illegal acts of violence against aviation, by attempting to limit their capacity for escaping justice. In particular, most states agreed on the "urgent need to provide appropriate measures for punishment of offenders".[35]

[34]Abramovsky, (1974) Part I, p. 390.

[35]Preamble to the Convention for the Suppression of Unlawful Seizure of Aircraft, 1970.

2.6. The Convention for the Suppression of Unlawful Seizure of Aircraft, 1970

December 1970 witnessed the adoption of the Hague Convention,[36] which in its first Article established "the offence" of unlawful seizure of aircraft and so created a definition capable of universal and uniform incorporation into municipal legal systems.[37] As shall be demonstrated, the intention of the drafters at the Hague drafting conference was to produce an agreement radically extending the initial advances made at Tokyo, by relying on two legal measures designed to deter offenders, namely extradition and prosecution. It was hoped that by employing the device described in the legal maxim *aut dedere aut judicare* (meaning "either deliver or prosecute") greater certainty of offenders being punished would be achieved.[38]

Rather than introduce a conventionally established system of universal jurisdiction, as had been suggested at the Conference by the delegate of Austria, in which any state, whether a party to the Convention or not, could prosecute suspected offenders found on its territory, the Conference opted for the jurisdictionally more restrictive provisions of Article 4.[39] It was agreed as a minimum standard that each Contracting State should "establish its jurisdiction" (that is, empower itself with the capacity to prosecute acts of in-flight violent air crime) when the offence is committed on board its registered aircraft (or on board aircraft leased without crew to a person in that state), when it receives a flight containing an alleged offender or when such a person is located on its territory. The Article also implies that such jurisdictional powers should be implemented whenever circumstances required.

Article 4 is the measure above all others which lifted the Hague Convention from the low jurisdictional standards of its 1963 predecessor and provided a much needed degree of legal sophistication in attempting to solve a difficult and complex problem. The obligation of a signatory under Article 4 to "establish its jurisdiction over the offence" in a number of different ways (discussed above) was the means by which the Convention ensured that its parties would provide for themselves sufficient jurisdictional powers and so be ready to act against offences committed within their

[36] Convention for the Suppression of Unlawful Seizure of Aircraft, 16 December 1970, The Hague. 860 UNTS 105; 1970 UNJYB 131; UKTS 39 (1972), Cmnd 4956; 22 UST 1641; TIAS 7192; JOF 23 Feb 73; 1973 RTAF 6; 46 Vert A 635; 10 ILM 133; 65 AJIL 440; 2 HRR 178; 11 Ind JIL 155; 75 RGDIP 297. Entered into force on 14 October 1971. By 1989 127 states had signed the agreement.

[37] For a discussion of the political factors which shaped the terms of the agreement in 1970, see Cheng in Cheng and Brown (eds.) (1989), pp. 37 - 40.

[38] The maxim is sometimes found in the alternative form, *aut dedere aut punire*, meaning "either deliver or punish".

[39] Dinstein (1972), p. 200.

sphere of interest - however they chose to define such interest.[40]

Unlike the Tokyo Convention, the agreement of 1970 gave great emphasis to extradition processes, by which alleged offenders can be moved from one jurisdiction to another for the purpose of standing trial. By the late 1960s, a surprising lack of international integration of extradition laws on hijacking continued to prevail, with several needless loopholes existing to prevent any serious attempts at judicially-based rendition of suspects. It is interesting to note that, even with the growing acceptance of the Tokyo Convention, by the beginning of 1969 the United States had yet to conclude extradition agreements on hijacking with either the United Kingdom or France.[41] The treaty of 1970 was intended to rectify such omissions. Radically extending the underlying objective of the earlier agreement, which was the securing of jurisdiction in at least one Contracting State, the Hague Convention aims at the definitive establishment of criminal jurisdiction over the offence in a broad selection of countries party to the agreement, in order to allow greater involvement by interested parties and wider opportunities for extradition of suspects from one state to another. In this way, otherwise unconnected states are linked in an unambiguously defined network for the purposes of suspect rendition. In practice, jurisdictional primacy (or the ability to exercise legal action over an offence when other states might also be interested in so acting) falls to the state in which the suspected offender is apprehended.[42]

By imposing no duty to extradite, Article 4 was left open to possibilities of abuse. It fails to take account of the fact that the natural tendency of the hijacker to divert an aircraft to a safe haven will often be rewarded on arrival by an offer of sanctuary. The utility of any proposal for mandatory extradition, however, is also tempered by very serious humanitarian and political considerations. For example, it would be unreasonable and politically unfeasible to expect states to conform to a provision obliging them to return political refugees to tyrannical regimes. At the Hague Conference, a US proposal to require extradition was diluted when several European states plus Australia, Canada and some others voiced deep reluctance to enter an agreement which limited their powers to deal as they wished with political offenders.[43] As Shubber noted in reference to the drafters of the Hague Convention and their unstinting search for

[40]B. Cheng in A.W.G. Kean, B. Cheng and Sir F. Tymms, "The Latest on Hijacking," *Aeronautical Journal* 77 (1973), p. 340.

[41]I.A. Shearer, *Extradition in International Law* (Manchester: Manchester University Press, 1971), p. 42 and p. 132, f. 1.

[42]Feller (1972), p. 208. Approaching the problem from another direction, Emanuelli has correctly pointed out that:

> " ... there are no principles that regulate the question of concurrent jurisdiction in the case where more than one State requests the extradition of the offender." Emanuelli (1975), p. 508.

[43]Dudley (1976 - 77), p. 77.

universal membership of the agreement:

> " ... had they opted for a mandatory extradition, the chances of a large partnership would probably have been compromised."[44]

By choosing a system which granted states absolute freedom to refuse extradition requests, the drafters hoped to encourage support for the agreement while recognising the necessity of allowing signatories a realistic level of discretion to decide upon the fate of detained offenders. The wording of the Convention made it clear, however, that in the absence of extradition, Contracting States would be expected to resort to prosecution of suspects. Nevertheless, with regard to an apparent duty contained in Article 4 (1) which is incumbent upon states to exercise criminal jurisdiction over the offence, it is evident that the Hague Convention offers no certainty of prosecution. While mandatory prosecution, either in preference to or following rendition, is clearly intended in the wording of Article 7 (which deals with the issue of trials) in reality prosecution is little more than optional. Article 7 merely obligates a Contracting State having detained a suspect to "submit the case to its competent authorities for the purpose of prosecution". For this reason, it is incorrect to suggest that "the Contracting State no longer has the option left open by the Tokyo Convention, to decide neither to extradite nor to try offenders."[45]

The Article was designed to ensure the prosecution of political offenders and even of political refugees in every case, so as to mandate punitive action by all Contracting States and thus minimise the anti-social activities of hijack havens. This is clear from the wording, "without exception whatsoever" which simultaneously displays the drafters' deep concern for their aim and illustrates their naïvity in failing to recognise that the very states against which the Article was directed would either elect to abstain from signing or ratifying the document or else pay lip-service to the agreement's provisions. Contracting States could, in fact, fully undermine the basis of Article 7 and hence of the Convention as a whole, while acting fully in conformity with its provisions. In such a scenario, a suspect's case would first be submitted to the state's competent authorities - most likely a department under the direct control of a government minister - which would then opt to proceed no further with the case

[44]Shubber (1973) I, p. 725. See also McWhinney (1987), pp. 43 - 4.

[45]Brenchley (1986), p. 11.

and to release the individual.[46]

This weakness inherent in Article 7 permits abuse of the agreement by unscrupulous executive branches, but it should not simply be viewed as a failure of the Convention's drafters. Rather, it should be recognised as a limitation of treaty law in general. While the dilution of an earlier, stronger version of Article 7 by its drafters was in part intended to encourage accession by western European and Middle Eastern states (which were adamant in their defence of political exceptions to a general rule of extradition) the primary obstacle to creating an effective provision was one of state sovereignty in the Convention's potential capacity for interference with domestic criminal justice systems. For some states, such as the United Kingdom, to have subscribed to an article mandating prosecution would have entailed radical domestic constitutional legal changes which would not have been countenanced.[47] In such a situation, therefore, conventional law proves unsuited to the creation of forceful laws required, leaving Article 7, in the words of Abramovsky, as both "beneficial and inimical to the solution of the hijacking problem".[48] Simultaneously it enables interested Contracting States to exercise - with a useful element of discretion - jurisdiction over acts of aircraft seizure, while implicitly permitting a *de facto* grant of safe haven from prosecution and extradition.[49]

Broadly similar problems to those of extradition and prosecution exist in relation to the Hague Convention's prescription on penalties, contained in Article 2, the shortest in the agreement:

> "Each Contracting State undertakes to make the offence punishable by severe penalties."

[46] McWhinney (1987), p. 48; R. Sabel in Lewis and Kaplan (eds.) (1990), p. 112. One example of suspected air saboteurs being freed under dubious circumstances prior to trial took place in Italy in 1972 after a bomb had exploded on board an El Al aircraft, causing some damage to its reinforced baggage hold. Although Italian police had arrested two suspects on firm evidence received from unwitting accomplices, authorities released the men, citing as justification that the device used "was not adequate to destroy the airliner." C. Dobson and R. Payne, *The Weapons of Terror: International Terrorism at Work* (London: Macmillan, 1979) p. 124.

[47] Dudley (1976 - 77), p. 77.

[48] Abramovsky (1974) Part I, p. 398.

[49] In addition to states' discretion, very practical considerations can militate against the operation of the Hague Convention's prosecution provisions. As Sundberg remarked in connection with a Swedish hijacking case, attempted prosecution in the absence of strong and satisfactory evidence can risk the legally and politically undesirable consequence of "a scandalous acquittal". In such circumstances, it may be more prudent for prosecuting authorities to take advantage of Article 7's loophole, opting to drop charges. Sundberg, (1971) p. 416.

This measure was hoped to present a system suitable for application in diverse legal systems, proving politically acceptable for ratification purposes and which would not interfere with sovereign states' rights to impose penalties deemed appropriate by them. This resort to compromise, however, produced once again a supine article, incapable of meeting the demands made of it. What was required was a definitive common standard which, in fact, could have been achieved while catering for states' individual sentencing policies. Instead, Article 2's loosely worded provisions reflect those of Article 7. The limitations of the general medium of treaty law are such as to militate against the success of Article 2 encouraging, indeed requiring, a compromise to be made to provide rules on punishment acceptable to a broad constituency, no matter how weak the resultant rules may become. Had the article set out a fixed penalty for acts of hijacking, then many states wishing to grant asylum on the grounds of a political offence exception would have eschewed the Convention in its entirety. On the other hand, states taking a firmer line on punishment would be unwilling to implement an instrument aimed at deterrence and international control if it did not incorporate some common standard on punishment. As it seems to have been impossible to have reconciled the interests of the eastern bloc, western Europe, the United States and Middle Eastern states, it is not surprising that the Hague Conference ultimately adopted Article 2 as it now stands, in an effort to salvage some degree of order, however inexact.

In terms of controlling non-political aviation crime, it was always clear that effective punitive measures would provide the agreement with the powers required to establish the framework for worthwhile norms on suppression.[50] In Article 2, however, this framework was eroded by the politically expedient compromises of states. The resultant variations in the severity of punishment simply encourage the hijacker, whether refugee, extortionist or terrorist to seek sanctuary in the most ideologically compatible state available to him or her. Furthermore, this inequality has proved to be a limitation in the operation of Article 7's extradition procedures with, for example, extradition being refused if penalties in the requesting state are not permitted in the requested state. Thus, Italian authorities opted to prosecute US Marine Corporal Raffaele Minichiello, rather than allow extradition to the United States, where capital punishment could have been imposed.[51] Also, the possibilities of abuse of a discretionary punitive system are illustrated by the fact that Minichiello served only eighteen months of a seven-and-a-half year sentence imposed by an Italian court.[52] Thus, even if the Hague Convention's exhortation to impose severe penalties were to be implemented, it would not rule out the possibility of a state pardon from the executive, or of parole, being granted to avoid future terrorist blackmail. Evidence of the Hague formula being misused by certain states under pressure from terrorist groups is offered by Clutterbuck:

[50] It should be noted that some scholars doubt the existence of any deterrent effect from imprisonment on the activities of terrorists. See Bassiouni (1979), pp. 768 - 775.

[51] Joyner (1974), p. 211, f. 103.

[52] *Ibid.*, p. 174, f. 25.

> "Virtually every convicted Palestinian hijacker has been freed, usually very soon, and often as a direct result of a further terrorist incident or the threat of one."[53]

Historically, states have always sought to maintain a measure of freedom in determining whether or not suspects should be delivered to another sovereign power's jurisdiction for the purpose of prosecution - particularly when political factors are present compounding the difficulty of the decision-making process.[54] A principal inadequacy of the Hague Convention involves its failure to provide unequivocal terms on dealing with so-called "political offences" which are regarded by some states as constituting an exception to the general rule that alleged offenders should be rendered up to jurisdictions wishing to place them on trial.

The Convention's failure is due to the irreconcilability of different states' domestic policies on this issue. The Soviet Union and other eastern European states have consistently argued that in the absence of agreed penalties being imposed, automatic extradition of hijackers to the state of registration of the aircraft should always take precedence over purported "rights" to grant political asylum. In this way, it is claimed, jurisdiction over offences could be premised on one clear basis. International disputes would therefore be prevented, the state which usually has the greatest interest in securing prosecution would always take control of the case and no incentive would exist for hijackers to land in friendly states. (This final point rests on the rather doubtful assumption that universal adherence and implementation would take place.)

Conversely, western European countries and many Middle Eastern states have consistently favoured the overt recognition of political offence exceptions,[55] while the United States has remained selectively doubtful of their utility in the context of air crime but recognises the inherent difficulties in operating any internationally agreed

[53] R. Clutterbuck, *Kidnap, Hijack and Extortion: The Response* (London: Macmillan, 1987), p. 8.

[54] C. Van den Wijngaert, *The Political Offence Exception to Extradition: The Delicate Problem of Balancing the Rights of the Individual and the International Public Order* (Deventer: Kluwer. 1980) pp. 4 - 18. For an excellent review of early writers' views on the legitimacy of political offence exceptions to extradition see B. Africa *Political Offences in Extradition* (Manila: Benipayo, 1926), pp. 97 - 107. More recent analysis can be found in L.C: Green, "Extradition v. Asylum for Aerial Hijacking," *Israel Law Review* 10 (1975), p. 207; F.C. Pedersen, "Controlling International Terrorism: An Analysis of International Force and Proposals for Multilateral Cooperation," *Toledo Law Review* 8 (1976), pp. 231 - 241.

[55] McWhinney (1987), p. 98.

system of mandatory extradition.[56] In truth, the Soviet stance displays a failure to grasp the political realities of a world in which sovereign powers need not bind themselves to norms which they do not trust, while the western approaches condemn norms on the issue to a level of near powerlessness. Clearly, standardisation of the subject cannot be expected to be found easily.

Article 7's requirement to act "without exception whatsoever" is intended to guarantee the taking of judicial action in all cases, be they motivated from the very best and understandable of intentions. Any step closer to mandatory extradition, however, would have been unacceptable to the many states wishing to take a case by case approach in considering a hijacker's circumstances and their domestic political climates. However, as has been noted above, a *de facto* political offence exception may be deduced from Article 7's loophole regarding the submission of a case to "competent authorities". In any case, in the absence of any express reference to political offence exceptions or to fixed penalties in the Convention, there is no impediment to courts tacitly and imperceptibly giving weight to motivational factors in sentencing convicted offenders.[57]

International law can easily be limited by such constraints as states' domestic priorities, fears, prejudices and practical capacities. It is perhaps unfortunate - though certainly not surprising - that the negotiations of 1970 resulted in the somewhat artless muddle of the Hague Convention. In recognising a right to refuse extradition, in failing to specify clear requirements on prosecution, in ignoring vital issues of punishment, in omitting reference to parole and in its silence over granting political asylum, the Convention benefits states which seek the pragmatic accommodation of both punishment and asylum for offenders - options which should never be viewed as mutually exclusive. On occasion, France has granted political asylum after imprisonment, to political offenders and refugees who have employed hijacking to facilitate escape, as in the cases of Holder-Kerkow and Brown.[58] More remarkably, however, the Federal Republic of Germany granted, in 1972, political asylum to ten Czech nationals despite their having killed the pilot of the aircraft which they hijacked.[59] As McWhinney has pointed out:

> "In the actual jurisprudence, countries like Sweden, Switzerland, France, Austria, Greece, West Germany, Denmark, Italy, have persistently refused to consider extraditing hijackers where there is clear, or even colourable, evidence of a "political" motive for the hijacking. These countries have preferred, instead - rendering lip service at least to the principle *aut dedere, aut punire* - to try the hijackers before their own

[56] F.E. Loy, "Some International Approaches to Dealing with Hijacking of Aircraft," *International Lawyer* 4 (1970), p. 450.

[57] Green (1975), p. 215.

[58] Fingerman (1980), pp. 129 - 130.

[59] A.E. Evans, "Aircraft Hijacking: What is Being Done?" *American Journal of International Law* 67 (1973), p. 652.

> national criminal courts, the sentences generally being, because of the "political" element, very light, or even nominal to the point of being absurd."[60]

In summarising the faults of the Hague Convention it is appropriate to observe that the reliance placed by its drafters on the strengths of multilateral cooperation was always bound to be inadequate to control the crimes against which the Convention is directed. First, because the success of the international agreement depends upon universal ratification for any measure of success, the refusal of even one active hijack haven to accede can result in the entire venture being considerably less than a complete success from the outset. Furthermore, it is equally clear that as a convention of this type is merely declaratory of the intentions and undertakings of states at some time in the past, the agreement's operational qualities will not even derive from extensive membership if Contracting States recant or acquiesce in their undertakings. While these difficulties are common to international agreements as a whole, the plight of the Hague Convention lies in the additional fact that it attempts to secure the compliance of sovereign powers with politically delicate undertakings while making no attempt to enforce that compliance with sanctions in the event of breach.

In assessing the value of the Hague Convention it is important to consider its measures dealing with jurisdiction, extradition, prosecution and punishment as key impediments to controlling acts of violent air crime. Indeed, the delegate of France at the Hague Conference summed up the shortcomings of the agreement when he noted:

> "It contains the obligation of apprehension of the alleged offender, the possibility of extradition, the obligation of reference to the competent authority and the possibility of prosecution."[61]

In addition to barring progress in the struggle against hijackings, these same considerations have prevented a law-based solution from being fully developed to assist in countering aviation sabotage, which for administrative reasons was not included in the Hague Convention but which was dealt with shortly after the completion of the document, at a Conference convened by ICAO in Montreal.[62]

2.7. The Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation, 1971

The problems of the international community in dealing with unlawful interference with aircraft were timeously shown by the explosion on board a Swissair aircraft on 21 February 1970, in which forty-seven

[60] McWhinney (1987), p. 98.

[61] ICAO Doc. 8877-LC/161, p. 17.15, reprinted in S.K. Agrawala, *Aircraft Hijacking and International Law* (New York: Oceana, 1973), p. 132.

[62] Cheng in Cheng and Brown (eds.) (1989), p. 42.

passengers and crew were killed.[63] While an act of aircraft sabotage often takes place within the jurisdiction of one state, it will assume international dimension if the offence originates outwith that state or if the perpetrator escapes from it to another country, or is otherwise found abroad. For this reason, and because of the numerous and immense risks posed to civil aviation by unlawful acts of interference, the Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation was formulated in 1971 at Montreal.[66] As the only factor which had prevented the Hague Conference from dealing with aviation sabotage had been a lack of time, as an international legal agreement on the issue was urgently required and as the Conference of the previous year had efficiently catalysed a determined, albeit imperfect, fusion of wills, the Hague Convention was deemed to be a suitable model on which to base the new instrument.

Because of their close drafting similarities, it follows that the latter of the two agreements became tainted with the imperfections of the former. From the outset, therefore, the Montreal Convention was predestined to be unable to deter the crimes which it was intended to suppress. In addition to the familiar problems of air crime, the drafters at Montreal were forced to contend with the additional factors of identifying and detaining suspects, most of whom would not be on board the aircraft at the time of their attack. As the two earlier Conventions of Tokyo and the Hague concern only violent acts committed on board aircraft "in flight" neither could have been used to cover external interference with or destruction of stationary aircraft situated on the ramp at airports.[65] This was due to a reluctance on the part of the drafters to interfere with state sovereignty by imposing international obligations where national laws might have sufficed.[66] By the late 1960s, however, it had become evident that terrorist attacks would not dimish in number without multilateral action, so necessitating a firmly based approach to these types of offence.

Reference to the Montreal Convention reveals a striking similarity between it and the Hague agreement. Indeed, in all major respects the two sets of standards are virtually identical. For example, with regard to jurisdictional bases, the Montreal Convention's Article 5 mirrors the rules of the Hague Convention, Article 2. Equally, although the Montreal agreement would have benefited from the incorporation of a more strict and definite sentencing scheme to reflect the inevitable severity of the destructive crimes involved,

[63] Joyner (1974), p. 217, f. 12.

[66] Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation, 23 September 1971, Montreal. 1971 UNJYB 143; UKTS 10 (1974) Cmnd 5524; 24 UST 564, TIAS 7570; JOF 13 Oct 76; 1976 RTAF 43; 57 Vert A 732; 10 ILM 1151; 66 AJIL 455; 11 Ind JIL 742; 76 RGDIP 303. Entered into force on 26 January 1973. By 1989 137 states had signed the agreement.

[65] Tokyo Convention, Article 1(3); Hague Convention, Article 3(1).

[66] Abramovsky, (1975) Part II, p. 278.

the Conference predictably resorted to the terms of the Hague Convention's Article 2. On the question of extradition, the Montreal Convention, Article 7, made no progress on the measures of the earlier Article 7 on which it was modelled. Thus, the inconsistency of purpose displayed in the earlier agreement's tacit acceptance of political offence exceptions remains, leaving the Montreal Convention as a bad copy of an imperfect blueprint.

2.8. ICAO's Attempt at Universal Enforcement of the Regime

Although all three air crime Conventions contain provisions on the settlement of disputes which could be used in arbitration or before the International Court of Justice, it was deemed necessary by several parties to the agreement that efforts should be undertaken to draw up norms on enforcing obligations.[67] ICAO once more turned to the medium of the multilateral convention to impart some much needed power to the agreements. In the belief that the Conventions' obligations could be enforced by negotiating a new instrument, in 1973 the 63 member ICAO Legal Committee considered three proposals for multilateral mechanisms.[68] One proposal made by Denmark, Finland, Norway and Sweden, was to adopt a new convention sanctioning "joint action" to be carried out via the ICAO Council against parties in breach of their obligations under the Conventions of Tokyo, the Hague and Montreal. Another suggestion forwarded by France was to amend ICAO's constituent document, the Chicago Convention 1944, in order that it would incorporate the principal provisions of the Hague and Montreal agreements and thus enable expulsion from the Organisation for serious breach of their norms. Finally, it was proposed by the USSR that a protocol could be drafted appending to the agreements of 1970 and 1971 a provision mandating extradition to the state of registration of an affected aircraft.[69]

Despite these provisions containing useful and progressive proposals, basic flaws existed to render each inoperable. For example, the joint action agreement envisaged by the Committee could have had no effect against states which had not implemented the earlier Conventions. The amendment to the Chicago Convention would almost certainly have taken several years to formulate, let alone to receive ratification by two-thirds of ICAO's membership, which would have been required for

[67] Cheng in Cheng and Brown (eds.) (1988), pp. 46 and 51.

[68] For a detailed analysis of the preparatory bargaining which was carried out within an ICAO Legal Committee sub-committee see McWhinney (1987), pp. 48 - 55.

[69] FitzGerald (1974), pp. 178 - 180; McWhinney (1987), pp. 55 - 57. This proposal continues to be supported by official Soviet opinion, with a senior Soviet official commenting in 1990:

> "We have long since been persistently trying to have the obligatory extradition of criminals accepted as a norm. We are convinced that this is the most effective measure to combat piracy in the air. "Mikhail Timofeyev, *Izvestia*, 25 July 1990, reprinted in Novosti Press Agency press release, July 1990, p. 2.

implementation.[70] Furthermore, as successful amendment would in no way have guaranteed either a workable plan or a solution which was not already effectively available under the terms of the Chicago Convention, such proposals were rejected.[71] With regard to systems advocating mandatory extradition, such as that of the Soviet Union to append a protocol to the Hague Convention, widespread opposition was voiced by many states in order to safeguard their coveted political offence exceptions to extradition.[72]

After extensive discussions, no agreement on enforcing the existing Conventions was reached. A principal reason for this impasse was the nature of the joint action suggested in the numerous proposals before the ICAO Legal Committee. In particular, the issue of imposing trade and other sanctions divided states. Some less developed states, for example, viewed such joint action as being an attempt by ICAO's larger aviation powers to limit their freedom of action as sovereign entities. Accordingly, these countries refused to enter any agreement calling for united action to be taken by all states against others in breach of their obligations.[73] By contrast, the Soviet Union and France cited Article 41 of the UN Charter in arguing somewhat unconvincingly that only the UN Security Council could be competent to impose collective aviation sanctions. Among several other arguments, France also maintained that under the Vienna Convention on the Law of Treaties, Articles 34 and 35, it would be inadmissable for any sanctions agreement to operate against states outwith the consensual limits of the treaty regime.[74]

A conservative stance within ICAO on the issue of alienating states, further militated against the imposition of sanctions. As Cheng noted:

> " ... the international community was not quite ready to accept majority rule for the imposition of sanctions."[75]

Although the failure of states to agree upon a new set of enforcement standards can be rated as a sad, though predictable, shortcoming of the Organization, the disunity over the issue might, at least, have

[70] Chicago Convention, Article 94 and J. Gertler, "Amendments to the Chicago Convention: Lessons from Proposals that Failed," *Journal of Air Law and Commerce* 40 (1974), p. 253. For a discussion of amendment procedures see Buergenthal (1969), pp. 207 - 209.

[71] Abramovsky (1975) Part III, pp. 456 - 457.

[72] FitzGerald (1974), p. 210.

[73] *Ibid.*, p. 201.

[74] Vienna Convention on the Law of Treaties, 23 May 1969, Vienna. UN Doc A/Conf 39/27; UKTS 58(1969), Cmnd 7964; 1969 UN JIB 140; 63 AJIL 875(1969); 8 ILM 679; 9 Ind JIL 288; 29 ZAORV 711. Entered into force 27 January 1980. See also Brower (1973), p. 1030; McWhinney (1987), pp. 58 - 59.

[75] Cheng (1973), p. 338.

prevented an ideological fragmentation of ICAO between hard line western powers and the many Middle Eastern states which voted against all proposals advanced.[76] The partial isolation of hijack havens might have been advanced by the implementation of a broadly based multilateral agreement extending measures of enforcement, yet the body empowered to make such an agreement found itself unable to act on account of states' distrust of the unknown.[77] Despite the efforts of the Legal Committee and a number of particularly violent contemporary acts of aviation terrorism to focus attention on the problem in hand. the Rome Diplomatic Conference and ICAO Assembly of 1973, which had been expected to frame workable norms, were unable to reach agreement in any form, perhaps on account of an undue complacency born of a general belief that the problems of the 1950s and 1960s had already been solved.[78]

2.9. The Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation, 1988.

In addition to efforts designed to enhance the performance of ICAO's *aut dedere aut judicare* standards, one example exists of an attempt by the Organization to extend the scope of its regime since the framing of the Montreal Convention in 1971. The upsurge since that time of terrorist violence taking place at international airports, directed against prospective airline passengers, led to a supplementary Protocol to the agreement being framed at a diplomatic conference convened on 9 February 1988 as the first true extension of the regime for over fifteen years.[79]

Sadly, a predictable emphasis was placed at the conference on the perceived need to extend the Hague formula to acts of airport violence, without any recognition being made of the fact that perfectly workable legal frameworks should already exist in ICAO member states and be sufficient for the task of securing the punishment of offenders. Rather than address the true security needs

[76]K.L. Milte, "Prevention of Terrorism Through the Development of Supra-national Criminology," *Journal of International Law and Economics* 10 (1975), p. 533.

[77]For a concise discussion of the Rome Conference 1973 and the events surrounding it see R.G. Bell, "The U.S. Response to Terrorism Against International Civil Aviation," *Orbis* 19 (1975), pp. 1337 - 1340.

[78]McWhinney (1987), p. 133. Note, in contrast, that air crime was still a problem for the aviation community. Dawson points out that only three weeks prior to the Rome Conference, on 5 August 1973, an attack on Athens airport resulted in four deaths and 55 injuries. Dawson (1986) II, p. 19.

[79]Protocol for the Suppression of Unlawful Acts of Violence at Airports Serving International Civil Aviation, 24 February 1988, Montreal. Misc 6(1988) Cm 378; ICAO Doc 9518. Entered into force on 6 August 1989. For detailed discussions of the drafting procedures and provisions of the Montreal Protocol, see Cheng in Cheng and Brown (1989), particularly at pp. 25 - 26 and 29 - 30.

of airports, delegates at Montreal preferred to retreat to discussions of outdated and unnecessary legal norms. Further critical analysis of the 1988 Protocol can be found in a detailed report of its provisions published by the current writer.[80]

The prolonged inability of the international community to provide reliable international agreements on all aspects of aviation crime has demonstrated the inadequacies of the adopted consensual approach to questions of terror violence and ICAO's inability to catalyse agreement from an ideologically disparate membership. These factors shall be discussed below.

2.10. Limitations of Global Treaty Law

To be effective, a treaty depends upon its parties adhering to the compliance norms which it establishes.[81] However, the success of a treaty will usually be determined in large measure during the process of its drafting. Conventions are formulated according to a consensus reached among states of diverse interests and political alignment. Whether a measure is incorporated in an agreement is therefore dependent not upon its viability and appropriateness, but rather upon its popularity and its ability to unite sufficient support from a broad selection of state delegations. In this way, for example, it is unlikely that any convention made within the confines of ICAO would provide for fixed periods of imprisonment for convicted offenders, even if this promised some degree of success in deterring illegal acts.

Also, as illustrated by the operation of the Hague Convention, Articles 2 and 7, multilateral agreements on hijacking cannot easily operate as instruments of deterrence without at least near universal consensus in drafting and subsequent uniform implementation. As a result, an initial goal of wide ratification must be met before the actual objectives of the agreement can be reached. However, because support for a draft convention increases across states' ideological divides as the severity and clarity of its articles is diminished, and because the two aims of universal membership and optimal viability are mutually exclusive, it follows that compromise must be employed in the drafting process as a balancing device. This militates against the promulgation of strong-worded and clearly drafted provisions and so results in the eventual adoption of ambiguous and weak undertakings. McWhinney has expertly expressed the difficulties to be encountered:

> " ... there seems to be something of an inverse relation between the number of States taking part in a multilateral convention, and the specificity and concreteness - or "bite" - of that convention. In other words, the greater the number of people who take part in the convention, the more likely it is that the convention [will be] vague and general or purely hortatory in its substantive contents, and lacking in specific remedies that are immediately operational in terms of actual problem-solving. That

[80] R. Hill, "Airport Violence and the Legal Principle *Aut Dedere Aut Judicare*." *Terrorism and Political Violence* 1 (1989): 78.

[81] Joyner (1974), p. 227.

> this should be so is not of course surprising: rather than run the risk of public failure involved in the break-up of a diplomatic conference without an agreed consensus document to produce at the end of it, the emphasis tends to be upon strictly verbal accommodations achieved through formulae expressed at such a very high level of generality and abstraction that they can mean all things to all men ... "[82]

The acquisitive nature of insular, self-interested states frequently results in a fragmentation of opinion around similar proposals, such that broadly compatible measures are opposed by blocs of ideologically allied states. This practice was illustrated at the Rome Conference, in which a clear divergence of opinion existed over the introduction of enforcement sanctions for the existing Conventions.[83] This amounted to a lack of positive agreement, rather than to any marked disunity between the delegates, concerning both the nature of the change and the type of mechanism to be used. Included in the proposals for a new protocol to the Hague and Montreal Conventions, for example, were suggestions from the USSR, Greece, The Netherlands and Nicaragua. In view of these states' inability to develop a common approach to the problems of enforcement, it is fair to conclude that it is clearly possible for states to defeat proposals the contents of which they broadly favour. By taking an intransigent stance, they can and do prevent the adoption of measures of common benefit and considerable significance.

The characteristics of working conventions also prevent ease of operation and adaptability. Once agreement has been reached, a convention can do no other than lock it terms into an unchanging document, ensuring not only a degree of historic certainty within its terms, but also of unavoidable rigidity of provision. Because an agreement is unable, of itself, to evolve and adapt to changing circumstances, unforeseen requirements and operating conditions, the most obvious means of updating it must be the cumbersome and time-consuming process of amendment - at best a continuing requirement which risks producing a range of different norms accepted by some states, but rejected by others. This rigidity derogates from the organic qualities needed in any regime concerned with the regulation of a constantly evolving area of interest, such as the suppression of a form of political violence or the deterrence of air crime as a whole. Clearly, a more pragmatic solution to the problems involved requires to be identified.

Taking account of the above-noted factors, the observation may validly be made that unlawful acts of seizure and interference cannot sufficiently be contained and deterred by the implementation of the Tokyo, Hague and Montreal Conventions and the Montreal Protocol, at least when considered in isolation. McGrane is correct to claim that "no really effective solution" was achieved by the regime in terms of providing for the suppression of air crimes.[84] Not only have states

[82]McWhinney (1987), p. 35.

[83]FitzGerald (1974), p. 201.

[84]McGrane (1975), p. 91.

disagreed over appropriate enforcement, but the agreements themselves have always been objects of controversy, thus creating rather than dispelling international tensions.

Trends in air crime, and especially in aviation terrorism, indicate that any efforts to halt the advance of the offences concerned rarely meet with total success. When, in 1970 and 1971, the world attempted to suppress aircraft hijacking and sabotage by establishing its international framework for prosecuting and punishing offenders, some terrorists were probably deterred but others were prepared to use the tactics of aircraft diversion and destruction to further their cause or organisation, while others looked for easier targets elsewhere in the industry. The Hague and Montreal Conventions were looked to as pioneering international agreements which might herald a new age of peace in the airways. Regrettably, as has been noted above, the treaties were based in large part upon a fundamentally wrong assumption - that political terrorists would *en masse* take note of globally promulgated legal norms and in so doing would be deterred from resorting to crime.

This ensured that the Hague formula would remain ineffectual, often being unable to influence the actions of the most determined, terrorist offenders. It is intriguing, therefore, to note the willingness with which most of the world's governments have returned to it as the one true means of reaching global agreement on a broad range of international terrorism types. Its piecemeal approach has been accepted over the years, so that while its basic standards have been adapted for application against such diverse criminal activities as hostage taking[85] and theft of nuclear materials,[86] no overall approach to terror violence as a whole has been adopted. Instead, it has been left to the UN family (including ICAO) to work on an *ad hoc* basis to plug the gaps in the response system, whenever such gaps are perceived. Remarkably, the Hague formula commands a position of importance despite patently having failed to deter so many committed and dangerous fanatics and having made no effort to introduce practical measures for incident prevention. One likely reason for its popularity with states is that it is an essentially inoccuous set of standards, unlikely ever to be enforced and thus easily ignored or overruled. It demands remarkably little of states and their legal authorities and so is a low risk mode of global regulation which has been proven to adapt easily to different styles of offence. The world's norm creating response to air crime has been politically "safe", yet practically sterile - left unaccompanied by any substantially more meaningful standards which might prove excessively contentious within the international community. As Horowitz has astutely remarked:

[85] International Convention Against the Taking of Hostages, 17 December 1979, New York. Un Gen Ass Resn/34/146, GAOR, 34th Sess. Supp 46, p. 245; Misc 12 (1980), Cmnd 7893; 18 ILM 1456; 20 Ind JIL 337; 40 ZAORV 305. Entered into force 14 June 1983.

[86] Convention on the Physical Protection of Nuclear Material, 3 March 1980, Vienna. Misc 27 (1980), Cmnd 8112; 18 ILM 1419. Entered into force 8 February 1987.

> "The seeming inability of national and international legislative bodies to curb terrorism derives, at least to some extent, from an appreciation of the political costs involved."[87]

To adopt a financial analogy, where political expense must be incurred by states, investment will often only be made when potential profit is thought to be guaranteed. The failure of the Hague formula to be more strongly worded might be attributable to an inability of states to identify worthwhile goals to be followed, because, as Falk has stated:

> "Law does not operate as an autonomous force. Its rules on crucial matters gain effectiveness as their claims overlay perceptions of self-interest."[88]

The existing regime of agreements represents the lowest common denominator for universal norm standardisation. It is unlikely that a significantly more powerful collection of global, judicially-based answers could be found in the short term to the difficult legal and political questions posed by international terrorism. One reason for this must be the unwillingness of governments to venture into the uncertainties and vagaries of meaningful cooperation. Put another way, the international regime has failed to overcome political acts of air crime because of states' overriding reluctance to pass powers from the domestic to the intergovernmental level. In the words of Friedlander:

> "Truly effective preventive and punitive measures have not been achieved because domestic political considerations have taken priority over international needs."[89]

Better than any other commentator, Cheng sums up the pre-eminent factor to be grasped in assessing the traditional *ad hoc* use of legal measures in addressing violent air crime:

> " ... it may perhaps be *à propos* to make two observations.
>
> First, it may be questioned whether this piecemeal and purely reactive approach is the best way to tackle international problems in general and international terrorism in particular. However, from this point of view, possibly all governments more or less require not merely a demonstrated need but also a popularly felt need for action, the response to which carries political mileage, whether national or international, before they decide to spare valuable executive, legislative or diplomatic time to deal with any problem. Thus, the hope for any comprehensive approach, however desirable in itself, is probably, apart from its inherent difficulties, not very realistic.
>
> Secondly, for perhaps very much the same reasons, what governments do is sometimes solely or largely a mere public relations exercise in order to show that something has been done, that some response has been made. Often, after all the fanfares,

[87]Horowitz (1977), p. 31.

[88]R. Falk quoted in Milte (1975), p. 535, f. 59.

[89]Friedlander (1977 - 78), p. 287.

> at the end of the day, in terms of legal obligations, no more than a mouse is born. However, at times the dreadful moans that accompany the mountain's labour can denote genuine difficulties, as experience has shown with both the duty to prosecute and the duty to extradite in the Hague Convention."[90]

The above factors indicate that a principal reason for the popularity of the Hague formula is, as Cheng has noted, its ability to be employed as a tool of public relations - a means of showing governments to be concerned and active in their condemnation of terrorism without actually requiring them to take any of the difficult decisions or necessary action positively to suppress terrorism.[91] In short, the use of the Hague formula may seem to have been an inadequate response, but it is certainly a predictable and understandable one which would be certain to attract broad intergovernmental support, due to the agreements' inability to fix the suppression of air crime as a genuinely taxing issue and a high priority for states.

2.11. Regional and Bilateral Administrative Agreements

While the forum of a universal agency has traditionally proved unable to overcome the problems of air crime, regional initiatives have at least displayed a greater propensity for success, on account of more ideological similarities and legal compatibilities being likely to be found on the abandonment of global bargaining. The community of interest which can, on occasion, be found in such fora as the Council of Europe and the Organization of American States, can also permit extensive agreement to be reached where more diversely constituted bodies produce loosely worded norms. As an example, the European Convention on the Suppression of Terrorism, 1977[92] displayed greater unity and direction in framing than either the 1970 or 1971 ICAO agreements, by consciously attempting to foreclose political offence exceptions to extradition in a number of cases. Also, "extradite or prosecute" standards of the OAS's Convention to Punish the Acts of Terrorism taking the form of Crimes Against Persons and Related Extortion that are of International Significance, 1971,[93] take the form of an obligatory norm, quite likely to be able to bind the members of the OAS community. The very extensive limitations of these

[90] Cheng in Cheng and Brown (eds.) (1989), p. 45.

[91] *Ibid.*

[92] European Convention on the Prevention of Terrorism, 27 January 1977, Strasbourg. ETS 90; 25 EYB 289; UKTS 93 (1978), Cmnd 7390; 57 Vert A 738; 81 RGDIP 606; 37 ZAORV 685. Entered into force 4 August 1978.

[93] Convention to Protect and Punish Acts of Terrorism Taking the Form of Crimes Against Persons and Related Extortion that are of International Significance, 2 February 1971, Washington D.C., PAUTS 37; 27 UST 3949; TIAS 8413; 65 AJIL 898; 76 RGDIP 638. Entered into force 16 October 1973.

agreements are discussed elsewhere.[94] In passing, it should be noted that Clutterbuck has described the legislative weaknesses to be found in the European Convention in the following terms:

> "[E]ven the most responsible European states, however much plagued by terrorism, are not prepared to commit themselves without a loophole to regard the terrorist offences listed in Article 1 (hijacking, kidnapping, attacks on diplomats or bombs etc endangering innocent people) as political, nor to extradite or prosecute offenders "without exception whatsoever". Some at least would certainly not have signed the Convention, still less ratified it, without the inclusion of Articles 5 and 13 which, in fact, directly contradict Article 1 and make it virtually meaningless. And, just in case they were unable to find any other way of evading an inconvenient obligation, they have only to deliver a letter to the Secretary General under Article 14 with immediate effect."[95]

Another important example of norm formulation on a regional scale can be identified in the bilateral agreements which are drafted by states with a common criminal problem, such as the Soviet Union and its neighbours or the United States and Cuba. Not only can bilateral accords allow for the inclusion of more specific terminology and greater operational strength than multilateral (and particularly universal) agreements, but their coverage of only two legal systems makes for easier accommodation of certain provisions, such as with the obligation to submit cases for actual prosecution. Also, haven states which refuse to accede to multilateral conventions may more readily be in favour of entering negotiations in which they deal with only one government. A key example of a workable and mutually beneficial agreement is the Memorandum of Understanding of 15 February 1973 signed by the United States and Cuba,[96] the deterrent effect of which was to reduce hijackings from the former to the latter until President Fidel Castro denounced it in October 1976.[97] Rather than succumb to

[94] Cheng in Cheng and Brown (eds.) (1989), p. 34; N. Gal-Or, *International Cooperation to Suppress Terrorism* (Beckenham: Croom Helm, 1985) pp. 175 - 337; McWhinney (1987), pp. 144 - 148; J.F. Murphy, *Punishing International Terrorists: The Legal Framework for Policy Initiatives* (Totowa: Rowman and Allanheld, 1985) pp. 11 - 15 and 33.

[95] R. Clutterbuck in M.D. Sandbu and P. Nordbeck (eds.), *International Terrorism* Report from a Seminar Arranged by The European Law Students' Association in Lund, Sweden, 1 - 3 October 1987, (Lund: Juristförlaget i Lund, 1989), p. 51.

[96] Cuba-United States: Memorandum of Understanding on the Hijacking of Aircraft and Vessels. Exchange of Notes at Washington and Havana, 15 February 1973, *International Legal Materials*, Vol. 12 p. 370. See McWhinney (1987), pp. 62 - 66.

[97] R.A. Friedlander, "Terrorism and International Law: What is Being Done?" *Rutgers Camden Law Journal* 8 (1977), p. 390.

the vagueness of the Hague formula, the accord made clear that any means of rendition would be acceptable and that prosecution in the state of capture was the only other alternative:

> "Any person who hereafter seizes, removes, appropriates or diverts from its normal route or activities an aircraft or vessel ... shall either be returned to the party of registration of the aircraft ... to be tried by the courts of that party in conformity with its laws or be brought before the courts of the party whose territory he reached for trial ..."[98]

After 15 April 1977, when the agreement ceased operating, hijackings increased in frequency between the two states, though throughout the 1980s they have been controlled according to an informal arrangement between the two states to return offenders to a hijacked flight's state of origin. As Cuba is the prime destination for American hijackers, successive US Administrations have been justifiably concerned to renew the Memorandum on its original, formal basis, illustrating the potential utility of this means of reaching agreement on non-terrorist rendition. The development of a worldwide network of such treaties would be impractical. Their widespread adoption, however, should not be discounted, particularly since the United States has commenced a policy of negotiating bilateral air services agreements which include provisions on prosecution and extradition of offenders.

2.12. Bonn Declaration on Hijacking

While it was clear that in the absence of enforcement machinery the Hague and Montreal Conventions would always remain second rate standardisation instruments, equally it had become evident at the 1973 Rome Conference that consensus was not to be found in a universal forum. Particularly on the subject of universally agreed sanctions imposition, there had emerged a declared annoyance on the part of several developing states with the true intentions of major powers. Abramovsky has quoted the Kenyan delegate from the Conference in this regard:

> " ... the idea of joint action was a very sensitive one for the Kenyan delegation and one they viewed with some skepticism, as it envisaged the imposition of sanctions against states. [since] they felt it was a weapon that powerful states might use to oppress and subdue the weak, even when circumstances did not justify sanctions."[99]

Dissatisfied with the impasse reached in the various conferences convened by ICAO, and especially at the proven inability to generate global interest in any agreement premised on sanctions imposition, it is understandable that major civil aviation powers sought a solution to the problems of hijacking outwith the formal structure of

[98] McWhinney (1987), p. 63.

[99] Kenyan delegate to the ICAO Legal Committee, reported in *ICAO Doc. 9050-LC/169-1*, pp. 47 - 48 (1973), quoted in Abramovsky (1975) Part III, pp. 462 - 463.

international organisations. For this purpose, the Heads of State or Government of Canada, France, the Federal Republic of Germany, Italy, Japan, the United Kingdom and the United States, while in economic summit at Bonn in July 1978, agreed on the unusually strong wording of a declaration on the suppression of hijacking:

> "The Heads of State and Government, concerned about terrorism and the taking of hostages, declare that their governments will intensify their joint efforts to combat international terrorism. To this end, in cases where a country refuses extradition or prosecution of those who have hijacked an aircraft and/or do not return such an aircraft, the Heads of State and Government are jointly resolved that their governments shall take immediate action to cease all flights to that country. At the same time, their governments will initiate to halt all incoming flights from that country, or from any country by the airlines of the country concerned. They urge other governments to join them in this commitment."[100]

This novel approach to norm establishment took advantage of states' international legal right, displayed in Article 1 of ICAO's constituent document, the Chicago Convention, 1944, to control activities in their sovereign airspace. The seven states displayed their contempt for the suggestion put forward at Rome that collective sanctions were inadmissible if imposed outwith the UN Security Council. Instead they adopted an attitude similar to that expressed in 1973 by US Acting Legal Adviser to the Department of State Charles N. Brower:

> "We simply take the position that states collectively may take any designated action not otherwise prohibited in law in the event another state fails to observe the principles set out in the Hague Convention."[101]

Unfortunately for the summit states, the success of the Bonn Declaration has yet to be demonstrated. The fear of political condemnation and diplomatic tribulation, as well as of unavoidable economic loss and of counter-sanctions, has resulted in the redundancy of the Bonn Declaration. Employed only once, against Afghanistan (a country with minimal interests in international civil aviation with which few Summit nations had regular scheduled services)[102] it has proved to be the opposite of its predecessors - a potent force with little prospect of practical application. The Declaration, in being concluded outwith the auspices of ICAO, takes on the appearance of a powerful, unilaterally framed statement of intent by a cartel of dedicated and interested states committed to the suppression of aviation hijacking. In reality, the unwillingness of each party to risk economic loss and terrorist reprisal outlines the great limitations of this overtly forceful type of international agreement.

[100] Joint declaration of western economic summit members, Bonn, 16 - 17 July 1978.

[101] Brower (1973), p. 1031.

[102] Cheng in Cheng and Brown (eds.) (1989), p. 47.

Its provision on enforcement action should have marked a major advance on the basic framework established by the Hague Convention, but its rhetoric alone is insufficient to influence the actions of hijack havens. In view of this factor, it is fair to suggest that the Bonn Declaration's primary achievement has been to highlight the hypocrisy of its framers, while air crime continues unaffected.

The entire international legal regime on air crime, established by lawyers and diplomats representing their states' civil services, was based on the idea that a dogmatic, though at times broad and faltering, legislative opposition to the crimes dealt with would serve to outlaw and deter them. However, the political masters of these framers, while content to ratify and advocate the principles, nevertheless recognised that any operation of the norms required to be tempered with a broad reliance upon pragmatism, in the form of judicious non-compliance when necessary or desirable. A case in point is to be identified in the British approach taken to resolving a hijacking in February 1982, involving five Tanzanian hijackers. The Home Secretary of the time, Mr William Whitelaw, announced that the hijackers would not "get any change out of Britain". In November 1985, however, it was reported that he had agreed to two hijackers being permitted temporary sanctuary on their release from prison, in accordance with a deal struck on their surrender.[103] It is significant that the Whitelaw deal did not contravene the terms of the Bonn Declaration. It nevertheless was not in full accord with its spirit of determination and represented an embarrassing setback for a government which had prided itself on its opposition to aviation terrorism. This case does not suggest that all accommodations with hijackers are iniquitous and should therefore be avoided at all costs, but rather demonstrates that the idealistic intentions and the absolutism of such documents as the Bonn Declaration will sometimes impose an unrealistically high hurdle for politicians to clear convincingly.

In economic summits subsequent to that of 1978, statements on terrorism cooperation and control were issued, though with little practical effect. In particular, in May 1986, the same seven nations' leaders issued a revised statement of intent, following their summit at Tokyo. The Declaration's opening clauses indicated that the zeal which had characterised the terms of the Bonn statement had not diminished in the intervening eight years:

> "We, the Heads of State or Government of seven major democracies and the representatives of the European Community, assembled here in Tokyo, strongly reaffirm our condemnation of international terrorism in all forms, of its accomplices and of those, including governments, who sponsor or support it.
>
> Recognising that the continuing fight against terrorism is a task which the international community as a whole has to undertake, we pledge ourselves to make maximum efforts to fight against that

[103]Dawson, (1986) II, p. 24.

scourge."[104]

Aimed primarily at Libya, but covering state sponsorship generally, its drafters strongly reaffirmed their "condemnation of international terrorism in all forms" and, importantly, decided to apply certain measures against "any State which is clearly involved in sponsoring or supporting international terrorism".[105] Predictably, the measures referred to were not innovative but if applied might have had a far-reaching influence upon states which support terrorism. Included in the declared responses were a refusal to export arms to any implicated state, limits on the size of its diplomatic and consular missions and denial of entry to any of its citizens who had been expelled from any other declaring state. The conditions of the Tokyo Declaration appeared to be straightforward in their application, yet following the trial of Nezar Hindawi (discussed below), the response of most states party to the Declaration was one of complacent inaction despite the weight of evidence of Syrian involvement in the 1985 El Al sabotage attempt. To compound matters, June 1987 witnessed the delivery by the Seven of the "Venice Annex" which specifically dealt with instances of state-sponsored sabotage, but which predictably has never been used.[106]

The seven major powers which framed the Bonn and Tokyo Declarations enjoy all the commanding influence of an oligopoly, both in terms of their economic strength and their significance in civil aviation markets. If they could agree upon and then implement a united policy of joint action to oppose terrorism or state sponsorship of it, their is little doubt that their influence alone could secure major concessions. However, if such measures are to have any effect, the current extent of political cooperation between states must first improve, to develop meaningful agreements on a greater range of subjects and between a greater number of governments. Thereafter, much greater willingness to engage in determined sanctions imposition would be required, if the Summit Seven's suppression regime were to be implemented.

Even with consensus reached at the highest level and with unambiguously worded provisions, the existing Declarations demonstrate the capricious attitude of major governments which together control some eighty per cent of the western world's civil aviation services.[107] While they sought to enforce previously established standards, their downfall was guaranteed by their failure to include any means of self-enforcement. Designed to work in the totally decentralised environment of states' own discretionary decision-making procedures, it was inevitable that the powerful terms of the Declarations would be ignored by the very powers which framed them. The activities of the Summits demonstrated that nothing

[104]Opening passage of joint declaration of western economic summit, Tokyo, 4 - 5 May, 1986.

[105]*Ibid.*

[106]President's Commission (1990), p. 37.

[107]Clutterbuck (1990) I, p. 77.

precludes states from creating meaningful agreements on terrorism suppression. The problem which remains to be solved must be that of channelling states' commitment to the task of implementing created agreements.

2.13. International Courts

Since UN Secretary General U Thant suggested in 1970 that hijacking trials could be conducted by a UN operated tribunal, various suggestions have been advanced on the questions of forming an international criminal court to deal specifically with acts of air crime.[108] As the hijacker's offence can involve many different and varied jurisdictions, Samuels has claimed that reference of a case to a multipartite body would prevent disagreement over conflicting claims.[109] A duty to submit all cases for prosecution would guarantee that the rationale of the Hague Convention, Article 7, would be recognised in international practice, as all cases "without exception whatsoever" would be considered judicially. Unfortunately, it is unlikely that harbouring states would view proposals for such a court favourably and would probably refuse to submit to its jurisdiction. Abramovsky's suggestion that the inclusion of hijack havens on the tribunal in an attempt to gain their support for it seems unlikely ever to meet with approval either from the powerful civil aviation states or from the sanctuaries themselves, which would be unwilling to abrogate their asylum-seeking monopoly in such a selfless way.[110]

Smith claimed that automatic extradition of prisoners to an international prison, within twenty four hours of their apprehension, would free states from the risk of blackmail and reprisal by terrorist groups, by removing the object of interest from that state's territory.[111] It could, conversely, be argued that such a system could result, not in the deterrence of blackmail, but rather in swifter attacks against the state of capture and its vulnerable targets, such as its diplomats abroad and its registered airline offices. These problems strike at the root of the plan but lesser organisational and procedural difficulties would also require resolution before an international scheme of this order could be implemented. For instance, a neutral site for the court would be required, as well as for an international prison, if it were deemed necessary.

[108] Abramovsky Part (1975) III, p. 480: R.A. Friedlander, "Coping with Terrorism: What is to be Done?" *Ohio Northern University Law Review* 5 (1978), p. 434: A.I. Hirsch and D.O. Fuller Jr, "Aircraft Piracy and Extradition," *New York Law Forum* 16 (1970), pp. 403 - 405: November, (1972) pp. 654 - 655: Samuels (1971), p. 170: C.L. Smith, "The Probable Necessity of an International Prison in Solving Aircraft Hijacking", *International Lawyer* 5 (1971), p. 269: Sundberg (1971), p. 419.

[109] Samuels (1971), p. 170.

[110] Abramovsky (1975) Part III, p. 479.

[111] C.L. Smith (1971), p. 274.

The security risks involved, in addition to the probable animosity of states opposed to the scheme would make this task very difficult. Independent judges acceptable to all participating states would similarly be difficult to find. Furthermore, the drafting of the court's charter and its procedural code, if such proved politically possible, would take considerable time. Overall, the diplomatic and political problems requiring resolution and the reluctance of states to have their hands tied by international agreement of this type, currently make the introduction of an international criminal court an unrealistic option.[112] It appears that until the disagreements and formalities involved in establishing such an institution are dispatched, there can be no real prospect for a workable court. A more realistic proposal would be for states to enter agreements over police and intelligence cooperation to enable better pre-emptive control of hijacking and interference.[113]

2.14. Conclusion

As has been demonstrated above, the international community's reliance upon purely legal approaches to the suppression of violent air crime has proved severely limited. Not merely have governments appeared to rely upon the doctrine *aut dedere aut iudicare* to deter all classes of offender, including the most fanatical and determined who will not easily be deterred,[114] but they have adopted it as a rallying-cry when new threats are perceived. Instead of seeking new and more practical means of deterrence and prevention and more determined forms of enforcement, ICAO members continue to resort to the Hague formula, even when it is unable to make a viable contribution to the cause of crime suppression, as in the case of the Montreal Protocol of 1988.

Notwithstanding the arguments which can be made to criticise the world's use of legal mechanisms in the past, it is vital to stress that standardisation of extradition, prosecution and punishment practices remains very important. Recollection of the jurisdictional *lacunae* of the 1950s prompts the conclusion that the global initiatives which followed that era were truly valuable in ascertaining common ground on which to build a vital framework for future administrative cooperation. On no account should policy-makers discard international legislative measures as being worthless. Equally, however, they must resist the temptation to elevate the ICAO regime to unrealistically high levels of importance in all circumstances. Its value lies in its administrative standardisation, rather than in any supposed suppressive qualities.

Unquestionably, the world would benefit from the continued evolution of the Hague formula, with continued emphasis being placed on the ultimate aim of economic enforcement against state sponsors of terrorism. The changing political climate of the 1990s may prove more amenable to such cooperation than that which prevailed during the cold war years. Yet, irrespective of law-based progress, more is required

[112]Friedlander (1977), p. 387.

[113]See Clutterbuck (1990) II, pp. 121 - 122.

[114]Dawson (1986) I, p. 736.

if the suppression of air crime is to be taken seriously by states. The world aviation community should seek a multi-pronged approach to this problem based, in large measure, upon much more practical and finacially expensive aspects of cooperation. The following Chapter comprises a case study of a particularly difficult form of aviation terrorism which simultaneously illustrates the potential poverty of ICAO's legal regime and highlights the pressing need for a new and aggressive approach to be taken to aviation security.

CHAPTER 3

A CASE STUDY OF THE KUWAIT AIRWAYS FLIGHT 422 HIJACKING

> "In bargaining with hijackers, governments pursue three potentially incompatible goals: securing release of all the hostages, deterring others from trying the same thing and punishing the hijacker. Release of the hostages and deterrence of potential future hijackers are far more important than punishment. Except insofar as it affects deterrence, punishment probably matters very little to governments."[1]
>
> "Because international terrorism is a form of political violence and ultimately requires political solutions, an effective response must come to terms with its political dimensions. Steps for coping with terrorism will therefore need to include both *measures of prevention* and *measures of deterrence*. Only through a combination of the two, consciously pursued in parallel, can we hope to reduce and eventually eliminate this spreading epidemic."[2]

3.1. Introduction

Having discussed the characteristics and manifold inadequacies of existing aviation norms on crime deterrence, a concrete example of the regime's shortcomings will serve to place the attractive, though theoretical, academic problems discussed above into the aviation industry's frame of reference, where legal puzzles and political debate must give way to practical considerations which can strike at the very viability of airline travel. Of the many cases of aviation terrorism which could be used to illustrate the difficulties of norm operation and enforcement, a recent example of political hijacking offers the greatest prospect of valuable analysis. The diversion of a Kuwait Airways Boeing 747 to Iran, Cyprus and Algeria presented considerable and widely varying dilemmas for several sets of authorities throughout the sixteen day period of the aircraft's illegal occupation in April 1988. In addition to the unbearable strain which was exerted upon international agreements, the domestic counter-terrorism policies of states involved were tested as rarely before, not least because of the unusually volatile mix of ideologies espoused by the concerned parties, some of which had been forced into the scenario against their will.

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[1] Baldwin (1976), p. 406.

[2] A.J. Pierre, "The Politics of International Terrorism," *Orbis* 19 (1975), p. 1262.

While other instances of aviation terrorism have presented equally intractable problems of negotiation and resolution, few have involved such a broad range of participants and of practical difficulties to be overcome. More importantly, no comparable political hijacking involving one readily identifiable target government (in this case Kuwait) has taken place since the general ratification of the Tokyo and Hague Conventions, making the Flight 422 incident a vital benchmark by which to judge the suppression regime in the most difficult of international crises. Although the late 1980s witnessed few international terrorist hijackings of civil airliners and hardly any which could rival those of twenty years earlier, this incident proved that the threat of serious political hijacking can never be discounted. The case involved a Kuwait Airways Boeing 747 on a flight path from Bangkok, Thailand to the Emirate of Kuwait, the principle facts of which are reproduced in the chronological list, below.[3]

After the chronology, the following sections discuss the actions and intentions of the parties involved in the hijacking, in order to establish the motivation and bargaining approaches of each. In turn, this leads into a section which deals with the inability of the regime as it currently stands to deter, prevent or contain such complex incidents of aviation terrorism and an evaluation of the Hague Convention's failure to keep pace with its targeted offence's evolution. Finally, the Chapter concludes that theory and practice each demonstrates the intractable complexities involved in operating the current norm set. In view of these factors, therefore, the question of seeking new directions in international norm creation and implementation is raised for later discussion.

3.2. Chronological List of Events

Tuesday 5 April 1988:
At 3.51 am. local time, Kuwait Airways flight 422 left Bangkok airport, bound for Kuwait. The aircraft, a Boeing 747 containing 97 passengers and 15 crew was hijacked over the Gulf of Oman by a team of eight[4] Arabic speaking males and diverted to Mashhad, Iran.[5] On landing, fuel was requested and a demand was made that the authorities in Kuwait should release 17 prisoners convicted of acts of terror violence. Threats were also issued to the effect that the aircraft

[3] The list was drawn from a more detailed (unpublished) chronology compiled by the current writer.

[4] A process of deduction arrives at this figure. With 112 persons embarking at Bangkok and, as shall be mentioned below, 102 of these being released and another two killed throughout the incident, eight persons on the initial passenger list remain unaccounted for. They are probably identifiable as active members of the original hijack group.

[5] Airports Authority of Thailand, *Fact Finding Report on the Seizure of Kuwait Airways Flight KU 422*, p. 1; *The Sunday Times*, 10 April 1988, p. A3; *The Guardian*, Thursday 21 April 1988, p. 8.

would be destroyed if approached.[6] A Jordanian passenger, later released, told of six or seven hijackers being armed with hand guns and grenades.[7] At night, a twelve hour deadline for demands to be met was made from the aircraft.[8] Also at night, a team of Kuwaiti officials left the Emirate, bound for Mashhad, at the request of the Iranian government.[9]

Wednesday 6 April 1988:
In the early hours of the morning, 24 women were released.[10] Later, the deadline of the previous night was renewed but was allowed to lapse.[11] During the day, threats were made specifically against three members of the Kuwaiti ruling family, held hostage on board.[12]

Thursday 7 April 1988:
32 male passengers were released, leaving only persons of Middle Eastern origin on board. The hijackers claimed that the remaining hostages were in serious danger and voiced dissatisfaction with the Kuwaiti delegation at Mashhad.[13] Deadlines were set for the departure of the aircraft to an unspecified destination. A hijacker fired shots towards Iranian guards surrounding the aircraft.[14] By late afternoon, refuelling had taken place, although the runway remained blocked.[15]

Friday 8 April 1988:
The departure deadline was renewed by the hijackers, who demanded

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[6] *The Glasgow Herald*, Wednesday 6 April 1988, p. 1; *The Guardian*, Monday 11 April 1988, p. 1; *The Independent*, Wednesday 6 April 1988, p. 1; *The Wall Street Journal*, Wednesday 6 April 1988, p. 1; *The Sunday Times*, 10 April 1988, p. A3; *The Guardian*, Thursday 21 April 1988, p. 8; *Lloyds' List*, Wednesday 6 April 1988, p. 1.

[7] *The Daily Telegraph*, Thursday 21 April 1988, p. 8; *The Guardian*, Wednesday 6 April 1988, p. 1; *The Times*, Wednesday 6 April 1988, p. 1.

[8] *The Daily Telegraph*, Thursday 7 April 1988, p. 48; *The Financial Times*, Wednesday 6 April, p. 1.

[9] *The Guardian*, Thursday 7 April 1988, p.1; *The Times*, Wednesday 6 April 1988, p. 1.

[10] *BBC Six O'Clock News*, Thursday 7 April 1988.

[11] *The Observer*, Sunday 10 April 1988, p. 21; *The Glasgow Herald*, Thursday 7 April 1988, p. 1.

[12] *The Independent*, Thursday 7 April 1988, p. 1.

[13] *The Glasgow Herald*, Thursday 7 April 1988, p. 1.

[14] *The Glasgow Herald*, Friday 8 April 1988, p. 1; *The Daily Telegraph*, Thursday 21 April 1988, p. 8.

[15] *The Scotsman*, Friday 8 April 1988, p. 1; *The Times*, Friday 8 April 1988, p. 1; *The Glasgow Herald*, Friday 8 April 1988, p. 1; *The Guardian*, Friday 8 April 1988, p. 1.

runway obstacles to be removed.[16] In the early afternoon, the flight's Captain reported passengers being beaten. Shortly thereafter, a hostage was beaten on the aircraft's steps and a grenade was thrown from the aeroplane.[17] Departure was permitted. Prolonged attempts to land at Beirut were prevented by Syrian troops.[18] With fuel levels low, Cypriot authorities allowed an emergency landing at Larnaca airport.[19] Fuel was immediately requested, with a small amount eventually being provided by Cypriot officials.[20] Renewed demands were made for the release of the 17 prisoners in Kuwait.[21] A Kuwaiti delegation left the Emirate bound for Cyprus.[22]

Saturday 9 April 1988:
Before dawn, threats were made to destroy the aircraft unless immediate departure was permitted.[23] Hostage beatings were reported by the Captain.[24] A refuelling deadline of 10.30 am. was set in place, but avoided by Cypriot authorities which continued to stall discussions with the hijackers.[25] At 11.30 am., a Kuwaiti passenger was shot dead and thrown to the ramp.[26] A Cypriot official (Herodotou) and a Palestine Liberation Organization representative (Abdo) later visited the aircraft on several occasions, speaking with

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[16] *ITN Channel 4 News*, Friday 8 April 1988.

[17] *The Scotsman*, Saturday 9 April 1988, p. 1; *The Daily Telegraph*, Thursday 21 April 1988, p. 8; *The Guardian*, Monday 11 April, p. 5; Saturday 9 April 1988, p. 1.

[18] *The Guardian*, Monday 11 April 1988, p. 5; Saturday 9 April 1988, p. 1; *The Times*, Saturday 9 April 1988, p. 1; *The Scotsman*, Saturday 9 April 1988, p. 1.

[19] *The Guardian*, Saturday 9 April 1988, p. 1; *The Daily Telegraph*, Saturday 9 April 1988, p. 1; *The Independent*, Saturday 9 April 1988, p. 1; *ITN, News at Ten*, Friday 8 April 1988.

[20] *The Guardian*, Saturday 9 April 1988, p. 1.

[21] *The Sunday Times*, Sunday 17 April 1988, p. A12.

[22] *The Times*, Sunday 9 April 1988, p. 1.

[23] *The Guardian*, Monday 11 April 1988, p. 5.

[24] *The Sunday Times*, Sunday 10 April 1988, p. A3.

[25] *BBC Early Evening News*, Saturday 9 April 1988; *The Sunday Times*, Sunday 10 April p. A1; *The Observer*, Sunday 10 April 1988, p. 1; *The Guardian*, Thursday 21 April 1988, p. 8; *The Sunday Telegraph*, Sunday 10 April 1988, p. 1.

[26] *The Sunday Times*, Sunday 17 April 1988, pp. A1 and A12.

hooded gunmen.[27] In the evening, a young hostage was released and fuel was ordered by the hijackers for noon the following day.[28]

Sunday 10 April 1988:
At 7 am., a 25 minute statement was issued by the hijackers, warning against any military intervention being made against them. Fuel was again requested and the 17 releases once more demanded.[29] The PLO's chief representative on Cyprus (Ghazaleh) spoke on board the aircraft with the hijackers. Following the broadcasting of a statement from Cypriot authorities and the PLO, the noon deadline was dropped.[30] Abdo and Herodotou entered the aircraft in the afternoon for more talks, though these were immediately followed by a new fuel demand being made.[31] Perhaps fearing military action, several hooded gunmen removed the Boeing's inflatable escape chutes.[32] Just before the 4.15 pm. fuel deadline was due to expire, a passenger was beaten.[33] Abdo returned to the aircraft in the evening for a long discussion.[34]

Monday 11 April 1988:
In the morning, death threats against hostages were made, the hijackers having become uneasy at the failure of their bargaining. Abdo went to the aircraft, but was refused access. He spoke on the steps with a previously unseen hijacker who seemed to exercise greater authority than others previously encountered.[35] Afterwards, more death threats were made, prompting Herodotou to visit the plane, later

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[27] *The Independent*, Monday 11 April 1988, p. 11; *ITN, Afternoon News*, Saturday 9 April 1988; *The Sunday Telegraph*, Sunday 10 April 1988, p. 1; *The Observer*, Sunday 10 April 1988, p. 1; *The Sunday Times*, Sunday 17 April 1988, p. A12; *The Guardian*, Monday 11 April 1988, p. 5.

[28] *The International Herald Tribune*, Monday 11 April 1988, p. 5; *The Daily Telegraph*, Monday 11 April 1988, p. 1.

[29] *The Independent*, Monday 11 April 1988, p. 1; *The Guardian*, Monday 11 April 1988, pp. 1 and 5.

[30] *The International Herald Tribune*, Monday 11 April 1988, p. 5; *The Guardian*, Monday 11 April 1988, p. 1; *The Independent*, Monday 11 April 1988, p. 1; *The Times*, Monday 11 April 1986, p. 6.

[31] *The Financial Times*, Monday 11 April 1988, p. 34; *The Daily Telegraph*, Monday 11 April 1988, p. 1; *The Guardian*, Monday 11 April 1988, p. 1.

[32] *The International Herald Tribune*, Monday 11 April 1988, p. 5; *ITN, Early Evening News*, Saturday 10 April 1988.

[33] *The Daily Telegraph*, Monday 11 April 1988, p. 1; *The Guardian*, Monday 11 April 1988, p. 5.

[34] *The Times*, Monday 11 April 1988, p. 1.

[35] *The Guardian*, Tuesday 12 April 1988, p. 9; *The Financial Times*, Tuesday 12 April 1988, p. 1; *The Independent*, Tuesday 12 April 1988, p. 1; *The Sunday Times*, Sunday 17 April 1988, pp. A12 - 13.

accompanied by Abdo.[36] After several postponements won by the two officials, the hijackers carried out their threat, killing a second Kuwaiti hostage and throwing his body to the ground.[37] More threats and demands for fuel were made, with the hijackers' intention to depart to a "neutral" country being noted.[38] More talks with Abdo took place in the evening.[39]

Tuesday 12 April 1988:
In the early hours of the morning, a power generator malfunctioned, pumping poisonous fumes on board the 747. When the hijackers were explained the technical details of the problem, they accepted the situation.[40] Paradoxically, at daybreak, the hijackers announced that they were preparing for death, yet also requested breakfast and later asked for fuel.[41] Abdo visited the aircraft on several occasions (once with Ghazaleh) and reported in the afternoon that the team was wearing "death shrouds" made from sheets.[42] Tension rose temporarily when a Greek Hercules aircraft was seen arriving by the hijackers, who announced that they were ready to blow up the 747.[43] In the evening, more visits to the Boeing included, for the first time, one carried out by the airport manager and another involving both PLO men and a representative of the Algerian Interior Ministry.[44] In the late evening, 100 tonnes of fuel were exchanged for 12 male passengers,

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[36] *The Independent*, Tuesday 12 April 1988, p. 1.

[37] *The Daily Telegraph*, Tuesday 12 April 1988, p. 1; *The Independent*, Tuesday 12 April 1988 p. 1; *The Scotsman*, Tuesday 12 April 1988, p. 1; *The International Herald Tribune*, Tuesday 12 April 1988, p. 1.

[38] *The Guardian*, Tuesday 12 April 1988, p. 1.

[39] *The Times*, Tuesday 12 April 1988, p. 1.

[40] *The Observer*, Sunday 17 April 1988, p. 21.

[41] *ITN, Channel 4 News*, Tuesday 12 April 1988; *BBC, Six O'Clock News*, Tuesday 12 and Wednesday 13 April 1988; *The Guardian*, Wednesday 13 April 1988, pp. 1 and 10; *The Financial Times*, Wednesday 13 April 1988, p. 1; *The Daily Telegraph*, Wednesday 13 April 1988, p. 1.

[42] *BBC, Six O'Clock News*, Tuesday 12 April 1988; *The International Herald Tribune*, Wednesday 13 April 1988, p. 2; *The Sunday Times*, Sunday 17 April 1988, p. A3.

[43] *The Scotsman*, Wednesday 13 April 1988, p. 1; *The Sunday Times*, Sunday 17 April 1988, p. A3.

[44] *The Guardian*, Wednesday 13 April 1988, p. 1; *The Independent*, Tuesday 19 April 1988, p. 10; *The Financial Times*, Wednesday 13 April 1988, p. 1; *The Scotsman*, Wednesday 13 April 1988, p. 1; *The Independent*, Wednesday 13 April 1988, p. 1.

after which the aircraft was prepared for departure to Algeria.[45]

Wednesday 13 April 1988:
At 1.17 am., the aircraft left Cypriot territory, arriving at Algiers airport later in the morning.[46] Even before dawn, it had been visited twice by Algeria's Interior Minister (Khediri). During the meetings, the central demand concerning the 17 prisoners in Kuwait was reiterated.[47] By midday, a high-ranking delegation of Kuwaiti officials had arrived, led by the Emirate's Minister of State or Foreign Affairs (al-Oseimi).[48] Meetings between Algerian officials and the hijackers took place on board the plane throughout the afternoon, with the hijackers complaining of rising temperatures and deteriorating conditions. Officials apologised that "technical problems" prevented remedial action being taken.[49]

Thursday 14 April 1988:
A plea for the release of the 17 in Kuwait was made by a passenger, who noted that the hijackers were continuing to threaten hostage killings.[50] Throughout the day, teams of workers, including a physician, visited the plane.[51] In the evening, an elderly male hostage was released, with the hijackers once more calling for the release of the convicted prisoners.[52]

Friday 15 April 1988:
In accordance with the hijackers' request, Algerian radio broadcasts were made in which the government undertook to end the siege

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[45] *The Independent*, Wednesday 13 April 1988, p. 1; *The Guardian*, Wednesday 13 April 1988, p. 1; *The Sunday Times*, Sunday 17 April 1988, p. A3; *The Times*, Wednesday 13 April 1988, p. 1; *The Wall Street Journal*, Wednesday 13 April 1988, p. 1; *BBC, Unscheduled Bulletin*, Tuesday 12 April 1988.

[46] *The Glasgow Herald*, Wednesday 13 April 1988, p. 1; *The Scotsman*, Thursday 21 April 1988, p. 4.

[47] *The Scotsman*, Thursday 21 April 1988, p. 4; *The Times*, Thursday 14 April 1988, p. 1; *ITN, Channel 4 News*, Wednesday 13 April 1988; *BBC, Six O'Clock News*, Wednesday 13 April 1988; *BBC, Breakfast Time*, Wednesday 13 April 1988.

[48] *The International Herald Tribune*, Thursday 14 April 1988, p. 7.

[49] *The Times*, Thursday 14 April 1988, p. 22; *The International Herald Tribune*, Thursday 14 April 1988, pp. 1 and 7; *The Glasgow Herald*, Thursday 14 April 1988, p. 1; *The Independent*, Thursday 14 April 1988, p. 1; *The Daily Telegraph*, Thursday 14 April 1988, p. 1; *The Guardian*, Thursday 14 April 1988, p. 1.

[50] *The International Herald Tribune*, Friday 15 April 1988, p. 1.

[51] *The Times*, Friday 15 April 1988, p. 1; *The Scotsman*, Friday 15 April 1988, p. 1; *The Guardian*, Friday 15 April 1988, p. 1.

[52] *The Times*, Friday 15 April 1988, p. 1; *The Glasgow Herald*, Friday 15 April 1988, p. 1; *The Scotsman*, Saturday 16 April 1988, p. 1.

peacefully.[53] In the afternoon, more passenger pleas were made, again calling for the freeing of the 17.[54]

Saturday 16 April 1988:
As little visible activity was taking place, the hijackers organised an airside press briefing. Three journalists were brought to the aircraft and were read a prepared statement in which the central demand made of Kuwait and, for the first time in Algiers, a fuel request, were issued, both without deadlines. In response to the only question permitted, a hijacker stated that fuel would be required to facilitate escape following the resolution of the incident. Thinly-veiled threats were made against the three royal hostages on board.[55]

Sunday 17 April 1988:
Around midday, the hijackers announced that they would give Algerian authorities time to resolve the crisis.[56] Later, another passenger called for the release of the prisoners in Kuwait and suggested that the passengers were still under serious threat. After this, Algerian officials entered the aircraft for several rounds of talks.[57]

Monday 18 April 1988:
Following a visit by Khediri at 2.30 am., early breakfast was requested, to conform with the daylight fasting rules of Ramadan, which commenced at dawn.[58] In the afternoon a senior Algerian negotiator ("Hadj") went to the plane for talks.[59] This was followed by another demand message being relayed from a passenger - on this occasion the Kuwaiti prince.[60]

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[53] *The International Herald Tribune*, Saturday-Sunday 16-17 April 1988, p. 5.

[54] *The Guardian*, Saturday 16 April 1988, p. 1.

[55] *The Guardian*, Thursday 21 April 1988, p. 8; *The International Herald Tribune*, Monday 18 April 1988, p. 1; *The Glasgow Herald*, Monday 18 April 1988, p. 1; *The Observer*, Sunday 17 April 1988, p. 1; *The Times*, Thursday 21 April 1988, p. 7; *The Financial Times*, Monday 18 April 1988, p. 36.

[56] *The Glasgow Herald*, Monday 18 April 1988, p. 1; *The Independent*, Monday 18 April 1988, p. 1.

[57] *The Glasgow Herald*, Monday 18 April 1988, p. 1; *The International Herald Tribune*, Monday 18 April 1988, p. 1; *The Financial Times*, Monday 18 April 1988, p. 1; *The Daily Telegraph*, Thursday 21 April 1988, p. 8; *The Glasgow Herald*, Tuesday 19 April 1988, p. 6.

[58] *The Independent*, Tuesday 19 April 1988, p. 1; *The Guardian*, Tuesday 19 April 1988, p. 1; *The International Herald Tribune*, Tuesday 19 April 1988, p. 2; *The Daily Telegraph*, Tuesday 19 April 1988, p. 1; *The Sunday Times*, Sunday 24 April 1988, p. A13.

[59] *The Glasgow Herald*, Tuesday 19 April 1988, p. 6.

[60] *The Guardian*, Tuesday 19 April 1988, p. 1; *The Times*, Tuesday 19 April 1988, p. 1.

Tuesday 19 April 1988:
In the afternoon, the hijackers were visited by Algeria's Foreign Minister (Ibrahimi) who had earlier in the day returned from a short visit to Tripoli for discussions with Libyan authorities. More trips to the hijacked plane followed by other officials.[61] Before evening fell, one of the two remaining female passengers (both of whom were Kuwaiti nobility) made a customary hostage statement.[62]

Wednesday 20 April 1988:
Soon after midnight, police and civilian cars started shuttling between the airport terminal and the plane. Just after 3 am., the hijackers requested a visit from "Hadj".[63] After his visit, the hijackers issued a statement at 3.45 am., in which they announced that the incident would be brought to an end.[64] At 5.45 am., while Khediri addressed journalists at the terminal, the hijackers left the aircraft and were driven away.[65] 15 minutes later, the 31 remaining hostages were taken to the airport's VIP lounge for medical examinations.[66] During the day, al-Oseimi thanked Algeria's President Bendjedid and told the media that the releases had involved granting safe passage to the hijackers. The Kuwaiti news agency (KUNA) noted that they had been taken either to Beirut or Tehran. In Kuwait, the Emirate's Cabinet extended its thanks to Algeria, the PLO and Yasser Arafat.[67]

3.3. Analysis of Actions of Parties in Hijacking

3.3.1. The Hijackers

In analysing the significance of the KU 422 incident, it is crucial to appreciate what an exceptional challenge this type of hijack gang can pose to the states involved and to the international community. The group's skills and actions gave a public demonstration not merely of the practical limitations of treaty law but also of the inability of governments to act individually or concertedly for successful resolution of such problems. The hijackers' clear aims, consistent

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[61] *The Sunday Times*, Sunday 24 April 1988, p. A13; *The International Herald Tribune*, Wednesday 20 April 1988, p. 2; *The Glasgow Herald*, Wednesday 20 April 1988, p. 4; *The Guardian*, Thursday 21 April 1988, p. 1.

[62] *The Glasgow Herald*, Wednesday 20 April 1988, p. 4; *The International Herald Tribune*, Wednesday 20 April 1988, p. 2.

[63] *The Daily Telegraph*, Thursday 21 April 1988, p. 8.

[64] *The Guardian*, Thursday 21 April 1988, pp. 1 and 8.

[65] *The Scotsman*, Thursday 21 April 1988, p. 8; *The Independent*, Thursday 21 April 1988, p. 10.

[66] *The International Herald Tribune*, Thursday 21 April 1988, p. 1; *The Scotsman*, Thursday 21 April 1988, p. 8.

[67] *The Guardian*, Thursday 21 April 1988, p. 1; *The Independent*, Thursday 21 April 1988, p. 10; *The Financial Times*, Thursday 21 April 1988, p. 1..

control, tactical manoeuvring, media awareness, negotiating ability and general confidence were displayed throughout. This showed the extent to which terrorist hijacking has evolved in advance of response mechanisms, suggesting that similar future incidents could produce equal or greater difficulties for world powers and small nations alike.

Throughout the course of the siege, four principal aims of the hijackers became apparent. The first major objective was highly ambitious, though genuinely held by the team to be a practical goal. This involved the coercion of the Kuwaiti government into releasing the 17 convicted saboteurs from long terms of imprisonment or the prospect of capital punishment. Although exactly the same demands had been made unsuccessfully for several years by other terrorists opposed to Kuwait,[68] it became clear that the hijackers were determined and well-equipped to engineer a long siege. Faced with an Iranian government which the group hoped it could at least trust but which it later accused of collaboration with the Emirate,[69] the team left for Beirut in which a large measure of local support would have been assured from Shi'ite militants in the city's southern suburbs. In such a setting, added pressure could have been influenced upon Kuwait in the form of hostage dispersal from the aircraft, as had happened during the similar TWA hijacking in 1985.[70]

Refused access to the Lebanese capital and faced instead with Cypriot authorities, the hijackers continued to insist upon the release of the 17, even rejecting an offer of a "fuel for hostages" deal owing to their assertion that the prisoners required to be liberated before such negotiations could take place.[71] The hijackers continued to push for their principal demand to be met, irrespective of their location, enduring a week of discomfort at Algiers simply in order to continue their futile war of words. On surrendering to the Algerians, they positively stated that their "struggle" would continue, in so doing admitting defeat, yet showing defiance and emphasising the vital nature of their long-standing grievance. On so important a question the hijackers were not prepared to overlook or even disguise their failure in their closing statement, because the question of freeing

[68] For further information concerning the 17 convicted prisoners and the efforts to release them, see *The Sunday Times,* 10 April 1988, p. A3; *The Scotsman,* Tuesday 12 April 1988, p. 8.

[69] *The Glasgow Herald,* Thursday 7 April 1988, p. 1; *The Scotsman,* Friday 8 April 1988, p. 1.

[70] In the hijacking of TWA flight 847, which took place between 14 and 30 June 1985, hostages were decanted from the aircraft and distributed around safe-houses in Beirut. For further details see media reports of the period, B. Hoffman, *Shi'a Terrorism, the Conflict in Lebanon and the Hijacking of TWA Flight 847* (Rand Paper N711685) (1985); J. Testrake and D. Wimbish, *Triumph Over Terror* (Eastbourne: Kingsway, 1987); and Clutterbuck (1987), pp. 193 - 194.

[71] *The Sunday Times,* Sunday 10 April 1988, p. A3.

their comrades had been of such primary salience to their cause.[72]

The second identifiable objective of the team was to destablise the power base of Kuwait by seeking to alienate its two major socio-theological groupings of Sunni and Shia Islam. It is significant that both of the team's murder victims were Sunnis occupied in Kuwaiti public service,[73] while of the twelve passengers released at Larnaca, no Sunni was included.[74] The strategy of discrimination was accompanied by a series of attempts to discredit Kuwait from the cockpit by accusing the state of torture[75] and incompetence in negotiations.[76] These accusations were given support by the frequent use of passenger pleas in which vulnerable hostages, and commonly those of some considerable standing in Kuwaiti society, were forced to voice support for the terrorists' aims, openly blaming Kuwait for their continued torment.

This destablising objective was a predictable tactic for hijackers whose political inclination was towards Iranian ideology and the post-revolutionary doctrines of extremist Shi'ite factions. Their desire to export the Iranian revolution to the Emirate, through alienation of the communities and incitement to violence, was successfully countered by Kuwaiti authorities. The Kuwaitis regularly issued statements encouraging national unity through clearly publicising the government's dedication both to reach a peaceful solution and to avoid the very real dangers of political compromise in so doing. Hence, in the second aim of the hijackers, little or no success was found.

A third aim for the gang was to publicise its cause and so to draw the world's attention to its demands and claims. From the start, the hijackers' campaign was geared towards utilising the media, although there was no effort made to maximise publicity for its own sake. In particular, releasing all hostages other than the Arab passengers in the early stages made it unlikely that US media coverage would be directed to the hijacking in great measure. Equally, the press briefing on the aircraft steps at Algiers may have been intended to regain media interest in the case at a time of inactivity for the team but it was not deliberately employed, coordinated and manipulated to capture the headlines, as had happened three years earlier in

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[72] *The Guardian*, Thursday 21 April 1988, p. 8.

[73] The first victim, Abdullah Mohammed Habaab Shabeeb al-Khalidi, was a 25-year-old border guard, while the second, Khaled Ayoub Bandar, was a 20-year-old clerk with the Kuwaiti fire service. *The Scotsman*, Monday 11 April 1988, p. 1; and Wednesday 13 April 1988, p. 1; *The Guardian*, Friday 15 April 1988, p. 1.

[74] *The Times*, Thursday 14 April 1988, p. 1.

[75] *The Sunday Times*, Sunday 10 April 1988, p. A3.

[76] *The Daily Telegraph*, Friday 8 April 1988, p. 1; and *The Observer*, Sunday 17 April 1988, p. 1.

Beirut.[77]

Nevertheless, as a publicity-conscious operation the hijacking attracted public attention to the activities of the group, to the powerlessness of its adversaries in ending the siege and, perhaps most of all, to the continuing imprisonment of the 17 terrorists by Kuwait. The hijackers were strongly aware of the importance of favourable public opinion in their activities and employed a number of techniques to minimise the adverse news coverage which any terrorist hijacking is bound to attract. Soon after each landing, a statement was issued over the cockpit radio or via officials explaining in readily reportable and easily understood terms both the rationale for the incident and the demands being made.[78] By such means the incident was made to appear to be an element in a broader, legitimate struggle for Shi'ite liberation from western influenced rule, with the hijackers even lying about the identity of their two victims so as to suggest that the men were actively engaged in suppressing their cause.[79] It is fair to observe that the goal of obtaining publicity, while not being reached in the most forceful of ways, was achieved by the hijackers in an impressive manner.

With the continuation of the incident, the hijackers' instinctive concern for their personal safety grew more obvious, with Cypriot negotiators being informed that the aircraft should land at a "neutral" state,[80] rather than being made to crash on the Emir's palace in Kuwait, as had previously been suggested.[81] Furthermore, in both Iran and Cyprus there was concern shown for swift departure to new sites, perhaps encouraged by a feeling of unease at the possibility of military action being taken against the aircraft by Iranian troops at Mashhad or by Israeli or British forces arriving at Larnaca.[82] Once secure in Algiers, attitudes eventually moderated but the desire to evade punishment became predominant, with the hijackers opting at last for free passage in exchange for unconditional

[77] For information on the high profile hostage media briefing on board the hijacked aircraft during the 1985 TWA incident, see the writings of Captain John Testrake. Testrake (1987), pp. 129 - 133.

[78] *The Sunday Times*, Sunday 10 April 1988, p. A3; *The Times*, Saturday 9 April 1988, p. 1 and Thursday 14 April 1988, p. 1; *The Independent*, Thursday 14 April 1988, p. 1.

[79] The first victim, a border guard, was incorrectly described by his killers as an airline security guard. *BBC, Early Evening News*, Saturday 9 April 1988. The second victim, a clerk, was alleged to have been a "Kuwaiti officer". *The Guardian*, Friday 15 April 1988, p. 1.

[80] *Associated Press*, Monday 11 April 1988.

[81] *The Independent*, Monday 11 April 1988, p. 1; *The Guardian*, Monday 11 April 1988, pp. 1 and 5.

[82] *The Observer*, Sunday 10 April 1988, p. 21. At Larnaca, the hijackers issued demands for fuel as early as their first night at the airport. *The Guardian*, Saturday 9 April 1988, p. 1.

surrender. It is arguable that for a team which cited the only two possible conclusions of the incident acceptable to it as being martyrdom and victory, to have achieved neither represented resounding defeat, yet the hidden agenda of escape with life and limb may well have been an unstated, long term aim throughout. Irrespective of their actual intention, the fact that escape was achieved further enhances the professionalism of the team, the powers of which made realistic military opposition virtually impossible.

Organisationally, a command structure seemed to operate within the group, at least in terms of negotiating policy.[83] With explosives alleged to have been planted at Mashhad and with escape chutes removed at Larnaca,[84] they ensured that any military intervention would result in widespread fatality to hostages, captors and strike forces alike and so remained largely confident of their continuing safety. The competence and confidence of the hijackers were together another important factor in the longevity of the venture. Skills derived, most likely, from rigorous training were used with ruthlessness and efficiency when required and made it impossible for negotiators to win material concessions at times when lesser hijackers might have yielded to their efforts.[85] Despite the high risks entailed in escalating the incident by murdering a hostage while on Cypriot territory, the gang did so, electing to follow up the first killing with another two days later. These activities on board were carried out very discreetly, to avoid causing panic among the remaining passengers. This emerged in interviews with subsequently released hostages, who knew nothing of the two murders.[86]

The gang remained sufficiently detached from the emotional implications of their violence to exercise relaxed but firm control over the remaining hostages and to continue bargaining with the Larnaca control tower in a rational and measured way. Similarly, the hijackers were equally able to exert sophisticated psychological techniques upon passengers and crew, maintaining order on board the cramped and unhygienic jet for over two weeks and, when desired, resorting to torture while presenting a public image of complete civility during most radio exchanges. The group consistently avoided hasty overreaction to potentially dangerous developments while on the ground, as with the landing of the Greek military aircraft and the infiltration on board of poisonous fumes, both noted above. The hijackers' high degree of confidence was also shown in their occasional appearances outside the passenger cabins, often in full

[83] *The Sunday Times*, Sunday 17 April 1988, p. A13.

[84] *The Guardian*, Monday 11 April 1988, p. 5; *The International Herald Tribune*, Monday 11 April 1988, p. 5; *ITN, Early Evening News*, Saturday 10 April 1988.

[85] Dr. James Thompson of the Middlesex Hospital debriefed some hostages and was later able to conclude from his investigations that special psychological training had probably been given to the hijack group, which he referred to as "a special operations squad". *The International Herald Tribune*, Friday 22 April 1988, p. 2.

[86] *The Guardian*, Thursday 21 April 1988, p. 8.

view of armed guards patrolling nearby, as well as in their readiness to cooperate with authorities in administrative matters such as the admission of hygiene crews and food consignments and the movement of their aircraft on at least two occasions.[87]

Tactically, the hijackers used a wide array of measures to gain advantage over negotiators. The most effective of these were demand and mood variation in the conduct of negotiations together with a general deviousness, by which progress would seem to have been made towards settling the dispute, before priorities were changed, rendering previous discussions worthless. Yasser Arafat claimed that this approach was adopted in Cyprus, where the second murder came as a completely unexpected development within 24 hours of a deal almost having been struck and within minutes of what had seemed a constructive meeting with the PLO representatives.[88] This use of erratic demand and mood swings characterised the gang's approach to negotiations and passenger treatment.

On arrival at Mashhad its list of demands was first made known in unequivocal and disturbing terms but was followed only a few hours afterwards by the release of a sick hostage, with every indication being made that the hijackers were fair-minded and humanitarian combatants, eager to provide negotiators with goodwill gestures. Soon almost half of those on board had been freed by the hijackers who were prepared to take the extraordinary risk of limiting the list of passengers on the aircraft to those of Arab nationalities, in order to concentrate its campaign on Kuwait and to discourage external interference from western governments. This had the triple effect of simultaneously implying that the hijackers were prepared to give signs of compassion to hostages not directly implicated in their struggle; focusing very real threats on a more select, and so more vulnerable, collection of individuals; and stepping up the level of conflict with Kuwait.

The team's use of deadlines early in each negotiating setting placed pressure on states to respond either by attempting to satisfy requests immediately or by actively attempting to moderate the demands imposed. As deadlines were progressively extended and forgotten only to be reimposed and extended once more, negotiators were encouraged to believe that threatened violence would not be perpetrated on board. The ground violence at Mashhad and the killings at Larnaca served to emphasise the unpredictability of the team and its commitment to its cause. Only in Algeria were deadlines rarely imposed and never executed, although memories of such brutality as the murders at Larnaca would have kept Algerian negotiators alert to the dangers posed by the rational yet unpredictable gang.

The operation carried out by the anonymous hijackers of Flight 422 was unusual in its length, its complexity and its ability to confound international efforts to end it. Not only did it illustrate the

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[87] *The Guardian*, Thursday 7 April 1988, p. 1; *The Times*, Thursday 7 April 1988, p. 1; *The Daily Telegraph*, Thursday 7 April 1988, p. 48; *The Scotsman*, Friday 15 April 1988, p. 1.

[88] *ITN, Channel 4 News*, Tuesday 12 April 1988.

problems of governments' most senior officials to combat aviation terrorism at its most professional but, as shall be demonstrated, it rendered ICAO's air crime conventions inoperable.

3.3.2. Kuwaiti Authorities

If the hijackers genuinely believed that the Kuwaiti government would publicly announce substantive concessions on the issue of the 17 convicted terrorists, they were naïvely mistaken on a crucial element of their siege strategy. The Emirate's experience of intimidatory action for their release over the preceding four years had resulted in its leaders concluding that the dangers entailed in giving its terrorist enemies so major a propaganda victory should be avoided. Hence, throughout the 16 day hijacking it became clear that the Kuwaitis would not be seen overtly yielding to pressure on the principal aim of the incident.[89] This, combined with the government's policy of refusal to communicate directly with the gang[90] presented a unified and systematic operational framework on which to encourage the development of favourable public opinion with its own domestic supporters and with its political allies in the west. Yet behind the austere appearance of determined opposition to blackmail, it is evident that Kuwait was directly involved in the dynamics of negotiation with the firm objective of securing the safe release of its citizens.

In tandem with its requests to Iran, Cyprus and Algeria to keep the 747 grounded and to avoid granting concessions to the group, the Kuwaiti government was probably using its ministerial presence at each airport to coordinate the peaceful solution which it sought and even at times openly advocated. Although officials of Iran and Algeria complained of Kuwaiti delegations' resolute refusals to make any offer relating to the 17 prisoners,[91] the apparently powerless representatives' presence was vital to the success of negotiating efforts. The twin competences of supervising and assisting resident negotiators amounted to a difficult and complex damage limitation exercise in which two potentially mutually exclusive goals required to be satisfied. Simultaneously, it was necessary to ensure that negotiators directed the hijackers away from a belief that their demands were credible and capable of being granted, while discouraging the use of violence against hostages. Eventually Algerian involvement allowed both aims to be reached by presenting the terrorists with a compromise between the impossibility of a victory and the undesirability of a potentially bloody defeat. It is probable, however, that Algerian involvement in the case would have been promoted with the blessing of Kuwait which had been active in

[89] From the outset, the Emirate maintained that the issue of the 17 prisoners was not to be negotiable. *The Financial Times*, Wednesday 6 April 1988, p. 1.

[90] *The Observer*, Sunday 10 April 1988, p. 21.

[91] *The Times*, Friday 8 April 1988, p. 1; *BBC, One O'Clock News*, Thursday 7 April 1988; *The Wall Street Journal*, Thursday 14 April 1988, p. 1; *The Daily Telegraph*, Thursday 14 April 1988, p. 1.

organising the flight from Larnaca to Algiers.[92]

The Emirate's considerable trust in Algerian negotiators' powers to resolve the crisis was demonstrated when the leader of the Kuwaiti delegation at Algiers arrived at the airport and in an unprecedented display of optimism spoke of a "happy ending" at what he hoped would be the "last stage" of the hijacking.[93] Such uncharacteristic confidence and outspokenness would have been based on an informed knowledge of the progress made in the dealings with the terrorists by Cypriot and PLO intermediaries, whose actions and decisions were subject to Kuwaiti consultations and constant scrutiny.[94] This policy could easily account for the frequency of negotiators' journeys between the airport terminal and the aircraft at times of important negotiating development.

As the hijacking progressed, Kuwait's implacable unwillingness to be seen to be involved with negotiations began to waver and a readiness to cooperate with all parties (including, ultimately, the terrorists) became increasingly apparent. In the early stages, while the aircraft was situated at Mashhad, Kuwait was insistent that it should remain grounded, even suggesting that some unspecified norm of international law obligated the Iranians to prevent take off if departure was opposed by the state of registration of the aircraft (in this case, Kuwait).[95] Once the flight had left the jurisdiction of the Iranians, whom Kuwait clearly did not trust to resolve the incident in an acceptable manner, and the hijacking had moved location to Cyprus, the official Kuwaiti view moderated on this issue, first because of the overtly cooperative stance of the Cypriot government and the PLO and latterly on account of the introduction to the scenario of Algeria. Instead of issuing public pronouncements on the illegality of departure, Kuwaiti officials initially stated that some form of deal with the terrorists might be conceived of in which the offenders' flight from Larnaca would take place. The prior condition for the supply of fuel and the granting of departure rights was said to be the release of all hostages.[96] In fact, the flight to Algiers was secured with only 12 hostages being liberated, leaving the way unimpeded for the compromise of one week later which ignored the articles of the Hague Convention and which was at least acquiesced to by both Cyprus and Kuwait, signatories to the agreement.

The Kuwaiti position on the bargaining which took place at Larnaca and Algiers may have been particularly ingenious as it guaranteed that

[92] Yasser Arafat remarked to journalists that the PLO and Kuwait had jointly approached Algeria with the proposal to relocate the aircraft at Algiers. *ITN, Channel 4 News,* Tuesday 12 April 1988.

[93] *The International Herald Tribune,* Thursday 14 April 1988, p. 7.

[94] See the remarks of Cypriot spokesman Akis Fantis. *The Sunday Times,* Sunday 10 April 1988, p. A3.

[95] *The International Herald Tribune,* Friday 8 April 1988, p. 1; *The Times,* Friday 8 April 1988, p. 1.

[96] *The Glasgow Herald,* Monday 11 April 1988, p. 1.

press coverage of its activities would emphasise the image it endeavoured to present of deliberate unyieldingness and almost unrealsitic opposition to compromise on the terrorists' demands, in turn leaving the impression that the Emirate was above reproach in its conduct of the hijacking. This assisted its officials in their efforts to supervise mediation and formulate the safe release of its citizens. While other states in the bargaining process received criticism for their activities from western governments or international organisations, Kuwait was showered with praise for its principled refusal to free the 17 prisoners in its jails, with IATA describing it as having behaved "impeccably."[97] Kuwait seems to have allowed the incident to continue until the hijackers walked free and may have connived positively in the Cypriot/Algerian plan to do so. Evidence of Kuwaiti bargaining for a peaceful outcome is to be found in a report published in 1989 which maintained that in Algiers:

> "The 31 remaining passengers were freed after Kuwait pledged to give "early release" to a handful of Shia Muslim prisoners."[98]

Also note the jubilant reaction of Kuwaiti delegation members at Algiers after the liberation of the captives and captors. Al-Oseimi openly admitted that the conclusion had been engineered "in return for a safe conduct" and went further, implying that this did not constitute a concession to the terrorists.[99] He also thanked President Bendjedid of Algeria for his efforts, while the Kuwaiti cabinet expressed gratitude to Algeria, Arafat and the PLO. Despite its clear involvement in and satisfaction with the outcome of the hijacking, the Emirate escaped the high level criticism (discussed below) which was meted out to Algeria for encouraging the release of murder suspects.

It is both necessary and appropriate to note that the Emirate's approach to the problems of the hijacking reflected neither state support for the terrorists' cause nor any desire to placate those responsible for the incident in order to avoid future attacks. Rather, Kuwait's understanding of its own vulnerability, its aim of avoiding conflict on board the large and well defended Boeing 747 - an aircraft never successfully stormed previously - and its general powerlessness to influence the hijackers into surrendering unconditionally, led to the state's limitations being made apparent. These factors combined with the other vexing difficulties of the international crisis to reduce Kuwait's potential for successful resolution, forcing it to downgrade its expectations. In place of its original position on the granting of concessions, it joined forces with its negotiating partners and attempted merely to minimise the

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[97] *The International Herald Tribune*, Thursday 21 April 1988, p. 2.

[98] Editor's note contained in Carew-Jones, (1989) p. 51. Even during the course of the hijacking, a suggestion was made in the Abu Dhabi newspaper *al-Ittihad*, that Kuwait and the PLO had agreed in Larnaca to a plan suggested by the hijackers that death sentences passed on three of the 17 prisoners should be commuted. *The Independent*, Friday 15 April 1988, p. 8.

[99] *The Guardian*, Thursday 21 April 1988, p. 1.

propaganda aims of the hijackers by taking advantage of the incident's descent from intense media interest. The price acceptable to Kuwait for such negotiating success seems to have been the unavoidable failure of the Hague formula to secure the prosecution of suspected offenders.

3.3.3. Iranian Authorities

It is understandable that the arrival at Mashhad of the hijacked aircraft was not met with enthusiasm by Iranian authorities which had at first refused to permit the flight to land.[100] Not only was the Islamic Republic unwilling to become embroiled in a delicate and complex dispute between culpable radical Shi'ites and the innocent Kuwaiti government with which it was suffering poor diplomatic relations, but the geographical locus and politically inappropriate timing of the events compounded their difficulties.

The team's choice of Mashhad as a venue for the hijacking was ideal for its preparatory purposes of fomenting domestic Iranian support for its cause. As Shia Muslems and supporters of the radical Shi'ite terrorist groups of the Lebanon and Iraq, the hijackers would have been assured of large scale public support as well as the blessing of the large constituency of radical Shi'ite clergy in Mashhad, many of whom had been exiled from Kuwait.[101] In addition, the hijackers' cause would have found favour with many individuals within militant political groupings seeking new ways of exporting the revolution at a time when the more moderate power base in Tehran was seeking diplomatic initiatives in the event of stalemate in the Gulf war. For these reasons, the hijackers played upon the dilemma faced by the ruling pragmatists in finding a solution which would simultaneously meet with domestic approbation and satisfy the demanding requirements of the Emirate.

As noted above, a key objective of the hijacking was to intimidate the government of Kuwait, which had been allied with Iraq against the Iranians throughout the war, into releasing 17 terrorists. Iran may have been selected as a possible landing place in the ill-advised belief that its authorities would support the actions of the gang being directed against the enemy state of Kuwait. In any case the hijackers' early-voiced intention to leave Iran[102] and their subsequent determination to land at Beirut[103] implies at least the possibility of a more sophisticated, longer term plan having been developed to deal with possible non-cooperation from the Islamic Republic. The Iranian government must have understood that the hijackers' very cause placed it in a difficult political position domestically. Moreover, the aircraft landed at Mashhad within three days of elections to the *Majlis*, the Iranian parliament, at which

[100] *The Daily Telegraph*, Wednesday 6 April 1988, p. 1.

[101] *The Times*, Wednesday 6 April 1988, p. 5.

[102] *The Daily Telegraph*, Wednesday 6 April 1988, p. 38.

[103] *The Guardian*, Saturday 9 April 1988, p. 1; *The Independent*, Saturday 9 April 1988, p. 1.

extremists were viewed by many observers as standing to gain seats from the more moderate pragmatists who were losing credibility with the electorate following vital Iraqi advances in the war.[104] This suggests that the hijackers may have correctly identified that their actions could be made to exert considerable strain upon the ruling administration in Tehran and so catalyse a domestic crisis from which it would be difficult for the moderates to recover in the three days preceding polling.

In terms of crisis management there was little Iran could do either to foster meaningful levels of diplomatic cooperation between itself and the Emirate, which resolutely refused to become involved with Iranian bargaining,[105] or to act against the hijackers. Not only would the use of force against overtly Shi'ite hijackers have risked a new front of electoral support developing for militant candidates on the eve of national elections, but on a more practical level the 747 was almost universally regarded as being so near impossible to storm that any military action would have been virtually discounted from the outset as a final option only to have been attempted in the most critical of circumstances.[106] In addition to the team being large, with passenger evidence suggesting that it was also well armed, its professionalism and ruthlessness became apparent before long.

Iran's negotiating efforts were highly successful in view of the short time space involved. Initially, the Iranian ministers involved attempted to support Kuwaiti orders for the aircraft to remain grounded. Although a token amount of fuel was pumped aboard the jet to satisfy the hijackers' opening demand, the aircraft was surrounded by armed guards and physically prevented from leaving for three days while Iranian negotiators successfully deflected requests for departure. The involvement of Deputy Prime Minister Moayeri at the site of the incident further corroborated Iran's claims that it opposed the hijacking[107] and may have been instrumental in facilitating the two releases of 24 and 32 passengers and crew at Mashhad.[108] When Iran realised its need for external assistance in the crisis it was swift to request Kuwait to dispatch a delegation, despite the inescapable diplomatic friction which such a development was bound to entail.[109] When a Kuwaiti presence was established, the authorities in Mashhad actively continued to refuse requests for fuel and departure rights despite the intimidation exercised by the gang and the undoubted jurisdictional benefits in having the aircraft leave the country.

Only when violence became visible and was directed against both

[104] *The Independent*, Wednesday 6 April 1988, p. 1.

[105] *The Times*, Thursday 7 April 1988, p. 1.

[106] *The Observer*, Sunday 17 April 1988, p. 21.

[107] *The Guardian*, Wednesday 6 April 1988, p. 1.

[108] *The Scotsman*, Wednesday 6 April 1988, p. 1.

[109] *The Guardian*, Thursday 7 April 1988, p. 1.

hostages and Iranian personnel was the decision taken to allow take off. With crisis managers unable to solve the triangular dispute in which their government had been unwillingly placed, the Iranians justifiably elected to avoid bloodshed and to override the grounding demand of Kuwait. Crisis resolution virtually demanded that the hijackers be allowed to leave, if only because the extent of control able to be exercised over the hostages and the siege location could not be reduced by the Iranians without genuinely risking a great loss of life. Departure of the jet guaranteed an uncertain future but its continued presence would have threatened immediate and extreme violence on board the jet, which military force would not easily have contained and which could also have precipitated an electoral backlash in the polls of the day. Iranian authorities had few options but to permit departure, having endeavoured to seek a peaceful solution up to the point at which violence had erupted.

The Iranians showed signs of internal disagreement over their policies on dealing with the case, both while the aircraft stood on the ramp at Mashhad and after it had departed. From the time of the jet's arrival Iranian policy on departure was unclear. The first official announcement had stated that the aircraft would be refuelled and permitted to leave but this was soon overturned by the official Iranian news agency, IRNA.[110] While officials were supporting the Kuwaiti views on departure (limiting fuel supplies and blocking the runway) in Tehran Parliamentary Speaker Rafsanjani said that failure in negotiations might necessitate allowing the hijackers to go elsewhere with their demands and hostages.[111] Indeed, at one stage he suggested that stalemate in negotiations might result in Iranian authorities positively persuading the team to leave the territory.[112] Once the incident had moved to Larnaca, the Speaker made a statement in which he claimed that any attempt by the hijackers to seek asylum in Iran would be rejected, the offenders instead being put on trial.[113] Later, however, Rafsanjani stated, in contradiction to earlier assurances, that the hijackers might, in fact, be accorded political asylum were they to return to Iran.[114] Other Iranian sources seemed equally uncertain. Note the press conference of Tuesday 12 April 1988 in the Iranian Embassy in London, at which Foreign Minister, Dr Javid Larijani, categorically stated that Iran condemned the hijacking and would not permit the hijackers to return.[115] Shortly before this, authorities in Tehran had announced that a complete release of hostages might enable the team to fly back to Iranian territory.[116]

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[110] *The Daily Telegraph*, Wednesday 6 April 1988, p. 38.

[111] *The Wall Street Journal*, Wednesday 6 April 1988, p. 2.

[112] *The Guardian*, Thursday 7 April 1988, p. 23.

[113] *The Observer*, Sunday 10 April 1988, p. 21.

[114] *The Independent*, Wednesday 13 April 1988, p. 1.

[115] *The Financial Times*, Wednesday 13 April 1988, p. 1.

[116] *The Times*, Monday 11 April 1988, p. 1.

The uncertainty of Iranian policy was accompanied by suggestions of positive complicity in the conduct of the hijacking. After Iran's involvement in the crisis had ended, accusations were made that its authorities had conspired with the hijackers to permit the infiltration of accomplices and explosives on board while the aircraft stood at Mashhad. Although impossible to prove these allegations, the Emirate claimed that passenger evidence demonstrated that active participation in the team's activities increased during the Iranian stage of the siege and was matched by the substitution of heavier arms and explosives for those used throughout the initial stages of the hijacking.[117] Had Iran permitted more open media activity at Mashhad it might have been able to have proved that no such passage of persons and equipment had taken place. With its strict limitation of journalistic output to IRNA's official press releases, suspicion lingers on the question and cannot fully be dispelled merely by Iranian claims of innocence, leaving the Iranian involvement in the hijacking uncertain in its nature and motivation.

Even if it is assumed, however, that the arms and reinforcements alleged to have entered the aircraft at Mashhad did so at the instigation of an extremist faction within Iran and not with the direct support of the pragmatists in power, Iranian authorities can certainly be criticised for operating appallingly pliable airside access security systems. In the absence of firmer evidence, it is impossible to conclude that Iran offered assistance to the hijackers. In any case, there is little doubt that the terrorists left Iranian airspace feeling that their grievances had not been addressed to their satisfaction. Equally, it is reasonable to suggest that the power-wielding authorities were genuinely unable to solve the problem which they faced with the 747.

Had there been connivance at high levels to produce a three day publicity-seeking hijacking or else to engineer a conclusion beneficial to the hijackers' cause, it is highly unlikely that the gang would have wished to culminate their performance by flying off empty handed and continuing their siege for almost another two weeks. A more mutually acceptable scenario would have involved a staged storming of the aircraft and a secret release of the hijackers. That such a managed climax to the episode failed to take place suggests not only that the terrorists were in earnest in their demands (a suggestion borne out by the events of Larnaca and the impasse of Algiers) but that Iranian negotiators, politicians and armed forces were truly powerless to bring an end to the hijacking on the ramp at Mashhad.

3.3.4. Lebanese/Syrian Authorities

The decision to close Beirut airport could not have been taken easily by the responsible authorities in the Lebanese capital, first because of the hijackers' determination to land there and second on account of

[117] *The Independent*, Tuesday 12 April 1988, p. 1.

other airports' unwillingness to accept the arrival.[118] The policy decision to turn the flight away from Beirut was, nevertheless, the most appropriate course of action available to the state's officials. A very strong case could be made for suggesting that any state with a hijacked aircraft in its air space must grant assistance to enable a safe landing if desired by the pilot.[119] On the other hand, in this case, the norms of the international aviation community required to be ignored in favour of political factors relating to more than the short term safety of passengers and crew. The officials in Beirut would have known that a landing would have presented a new danger in the form of a separate hostage crisis.

Syrian forces controlling the airport correctly took many precautions to avoid the airliner becoming involved in the near anarchy of Beirut by making a landing impossible. In addition, however, the airport road leading to Beirut's southern suburbs was sealed off in an attempt to prevent any feared passage of militant Shi'ites from the area.[120] Such measures guaranteed that Beirut would not be permitted to practise its twin roles of hijack haven and kidnap centre for the Kuwaiti incident.

Not only had Syria's President Hafez al-Assad decreed after his troops had re-entered the city in January 1987 that no hijacked airliner would land there,[121] but Lebanon's acting Prime Minister Selim al-Hoss and Interior Minister Abdallah Rassi were equally unenthusiastic about the prospect of a landing.[122] Each would have been aware of the many practical and diplomatic difficulties to be encountered were the aircraft to have touched down on Lebanese territory. In particular, the likelihood of Shi'ite groups attempting to aid their ideological comrades on board was high, posing considerable tactical problems for the Syrian forces which were striving to keep control in an already taxing setting. Also, the Syrian government itself would have become embroiled in a dispute between the terrorists, supported by many factions close to home, and the Kuwaitis, who were politically and financially important to Assad.

The total lack of concern with which the control tower repeatedly rejected the pleas of crew, passengers and hijackers appeared cynical, if not positively inhumane, yet the authorities on the ground had a clear knowledge of their limitations as well as of the lawlessness which could reign in and around the aircraft if Beirut were to become

[118] Initially, the airports of Lebanon, Cyprus, Turkey, Syria and Greece declared an unwillingness to allow landing. *The Financial Times*, Weekend, 9/10 April 1988, p. 1.

[119] IATA's view, as described in *Jane's Airport Review, 1989*, p. 40.

[120] *BBC, Newsnight*, Friday 8 April 1988; *The Guardian*, Saturday 9 April 1988, p. 1.

[121] *The Times*, Saturday 9 April 1988, p. 24.

[122] *The Scotsman*, Saturday 9 April 1988, p. 1.

involved.[123] For a peaceful and internationally acceptable resolution of the hijacking to be salvaged it was essential that the hostage crisis be limited to the confines of the aircraft. In naïvely countenancing a seemingly humanitarian landing, the Beirut control tower could unwittingly have escalated the dangers faced by passengers and crew and made the already intractable complexities of negotiation even worse for the government of Kuwait and - more importantly - for that of Syria.

3.3.5. Cypriot Authorities

Just as it had proved so important for Syria to withdraw Lebanese involvement from the hijacking, it became increasingly vital to ensure that the tension of the case was not compounded by tragedy in the form of a forced landing either at Beirut airport or on the waters of the eastern Mediterranean. The decision of Cypriot authorities, ratified by President Vassiliou, to permit the landing served as a means of escape for the terrorists by which they could step back from their suicidal threats and as a form of emergency life support for the hostages.[124] The offer of refuge was based upon considerations of urgency and true humanitarianism. Neither the gang nor the new host government had sought the liaison in advance and, once active negotiation had commenced, each looked for methods of ending mediation as quickly as possible and of transferring the incident to another site.

Throughout the four day residency of the aircraft at Larnaca the Cypriots displayed a willingness to conform to Kuwaiti requests and so kept the hijackers talking without granting them demands of any material nature. For a small, independent state, possibly tempted to refuel the aircraft and allow departure to take place, this high level of commitment to finding a genuine solution illustrates the Cypriot government's concern to cooperate with Kuwait, an important trading partner and source of significant tourist revenue. In conjunction with local representatives of the PLO, Cyprus played a pivotal role in transforming crisis at Mashhad into resolution at Algiers, through the adoption and exercise of a high risk scheme of promises, delays and bargaining until such time as the efforts of negotiators sufficed to persuade the terrorists to leave.

While cultural compatibility may have assisted Iran in its negotiations with the Shi'ite hijackers, any ideological ties with mediators were lost when the jet left Mashhad. The Cypriots faced outbreaks of the most brutal violence, unseen in Iran, as the gang grew increasingly exasperated with Kuwaiti refusals to become actively involved in negotiations and with what the hijackers viewed as Cypriot time wasting.[125] Negotiators, however, doggedly refused to compromise upon these positions and so forced the terrorists to reconsider their

[123] *The Guardian*, Saturday 9 April 1988, p. 1; *The Times*, Saturday 9 April 1988, p. 1.

[124] *The Guardian*, Saturday 9 April 1988, p. 1.

[125] *The Sunday Times*, Sunday 10 April 1988, p. A1; *The Guardian*, Monday 11 April 1988, p. 5.

overall strategy and eventually agree willingly to take the Algerian escape route which had been promoted on Cyprus by all parties then involved. The high cost of Cyprus's infuriating delays and unfulfilled assurances was the killing of two hostages, encouraged by the hijackers' fleeting fear of military intervention and the need to show determination to the government of Kuwait and the world's media.

The avowed goal of Cypriot negotiators (contrary to the aims of the Hague Convention) was to secure the safe release of hostages, if necessary in return for the hijackers' freedom.[126] Cyprus apparently received and acted upon assurances from Algiers that transfer of the hijacking to Algeria would be undertaken with the liberation of the offenders as an intended consequence.[127] Cypriot support for the Algerian plan may have been the most effective means of observing the state's obligations under Article 9 of the Hague Convention (to ensure a resolution of the hijacking) but there can be no doubt surrounding the incompatibility of such a scheme's results with the spirit of the agreement as a whole. As Cyprus had no other effective means of ending the crisis peacefully and effectively, this incompatibility must reflect the weaknesses of the norms more than those of the government.

Areas of Cypriot crisis management which are open to criticism include the inability of the authorities and officials involved to control press freedoms adequately, their self-inflicted communications problems with the aircraft and the worrying inaccuracy of official and semi-official news releases. Each of these factors requires a brief analysis.

Although media openness encouraged accurate reporting at Larnaca, the apparently uncontrolled freedom enjoyed by journalists to film the activities of the hijackers at close range and to monitor radio communications made it difficult to avoid transforming the incident from a political incident into a publicity stunt.[128] Whereas in Iran regular news releases had been issued exclusively via the media of the state news agency and radio station, raising doubts as to the accuracy and objectivity of reports, the *laissez-faire* stance of Cyprus may have encouraged the bravado of killings and the melodrama of shrouded threats before a gallery of inquisitive journalists. While landing circumstances and the geography of Larnaca airport made secrecy impossible, Cypriot authorities could have adopted the media policies of the Algerians (discussed below) in order to keep journalists informed of progress while imposing fair restrictions upon their freedom of movement.

Media interest in Larnaca's newsworthy images led to certain press speculation that military intervention would take place at the

[126] Note the comments of Cypriot Interior Minister, Christodoulos Veniamin to the effect that the safe release of hostages was all that he cared about. *BBC, Breakfast Time,* Wednesday 13 April 1988.

[127] *The Times,* Thursday 14 April 1988, p. 1.

[128] *The Independent,* Monday 11 April 1988, p. 11.

airport.[129] Whether through radio bulletins or newspapers readily supplied by the Cypriots, the hijackers seemed to have become aware of the widely held view that a detachment of the British Special Air Service Regiment was nearby waiting to end the siege.[130] The hijackers were not sufficiently confident of Cypriot and PLO involvement in negotiations to trust even in their own security against attack. Also, the unannounced arrival of the Hercules aircraft caused unnecessary concern which could easily have been avoided had communications been better.

The third inadequacy of Cypriot policy relates to the consistent inaccuracy of the government's official spokesmen, in their dealings with journalists. Throughout the ordeal they openly speculated on such issues as refuelling and departure[131] and an early end to the hijacking.[132] Moreover, continual emphasis was placed by Cyprus on the need to adhere to the Kuwaiti demand to withhold fuel until all passengers were released.[133] On each of these occasions, the spokesmen were proved to have been factually inaccurate, raising a question mark over the general competence of the Cypriot negotiating and information policies at key points of the bargaining process.

In total, the Cypriots' policy of forcing the hijackers to reduce their expectations while reassuring them of their future welfare was perhaps the most effective solution available to a state of Cyprus's size and diplomatic position encountering on the one hand violent and unpredictable terrorists equipped for a long siege and on the other a targeted government which unswervingly refused to address the central demands which it faced. As with the Iranians, the option of permitting take off was unavoidable for Cyprus because, once again, authorities could not be confident of continuing to discourage the terrorists from turning to large scale violence. Unlike Iran, however, Cyprus had been actively engaged in cooperation with another state,[134] which had no direct involvement in the incident, and so was able to send the aircraft to a specific and mutually acceptable destination. Cyprus had succeeded in minimising violence, freeing hostages from the aircraft and releasing itself from what it would have regarded as the dreadful prospects of capturing and detaining Shi'ite terrorists and of implementing the undertakings of the Hague Convention against them.

[129] Note the highly speculative articles in *The Daily Mail*, Saturday 9 April 1988, p. 1 and *The Sunday Telegraph*, Sunday 10 April 1988, p. 1 which suggested that military action by British forces might take place imminently.

[130] *The Sunday Times*, Sunday 17 April 1988, p. A13.

[131] *The Financial Times*, Weekend, 9/10 April 1988, p. 1.

[132] *The Guardian*, Monday 11 April 1988, p. 1.

[133] *The Independent*, Wednesday 13 April 1988, p. 1; *The Times*, Tuesday 12 April 1988, p. 1.

[134] *The Scotsman*, Wednesday 13 April 1988, p. 1.

3.3.6. Palestine Liberation Organization

The PLO's purposes in involving itself in the hijacking can be divided into three categories: negotiation; publicity; and diplomacy. Its negotiating involvement, though supervised by Yasser Arafat from PLO offices in Kuwait and elsewhere, was carried out by the group's representatives on Cyprus (principally Ghazaleh and Abdo) and was effective in complementing official Cypriot activities by allowing the hijackers to deal not merely with servants of a western, liberal state, but also with delegates of a respected national liberation movement with which the team could readily identify. When Mallath Abdo, the assistant to the chief PLO representative on Cyprus, first entered the aircraft, his reason for doing so was reported as having been for interpretative purposes, the Cypriot negotiators being unable to speak Arabic.[135] Before long, however, it had become evident that the PLO representatives were engaged in much of the detailed discussions with the terrorists, sometimes entering the jet unaccompanied by Cypriot counterparts.

As the incident progressed it was further suggested by the media that Cypriot negotiators acted predominantly to facilitate agreement on the mechanics of departure while the PLO team handled the more onerous questions of politics and compromise.[136] Abdo soon became the negotiator favoured by the hijackers, his presence being requested on several occasions. While the Cypriot Director of Civil Aviation, Michael Herodotou, was made to communicate with the hijackers from a distance and with a megaphone, Abdo was received on board for more intimate discussions, suggesting that matters of substance were being dealt with, requiring a confidential meeting with a mediator in whom the gang could place its trust. Although the role of the Cypriot negotiators was important in the resolution of the hijacking, it was greatly enhanced by the activities of PLO representatives.

The command echelons of the PLO capitalised upon the work at Larnaca by using the negotiations as a source of badly needed publicity. In the same way as government ministers of Kuwait, Iran, Cyprus and Algeria were quoted and presented by the various news media, so Yasser Arafat was given a platform from which to show the world that his organisation was actively attempting to bring about a peaceful outcome to an important and difficult dispute from firmly within the limits of legitimate bargaining processes. This deliberate use of the media was important for the PLO because in the hijacking's monopolisation of news coverage, world attention was being turned away from the Palestinian *intifada* on the West Bank of the Jordan and the Gaza Strip. During this time, media interest in Israeli forces' brutality had served the PLO's cause well. By adopting a high media profile combined with active negotiations in the hijacking, Arafat gained in prestige while also promoting worldwide media continuity in Palestinian issues.

Diplomatically, the PLO was actively engaged in working on behalf of its Kuwaiti allies, through the efforts of negotiators in Larnaca and

[135] *The Sunday Telegraph*, Sunday 10 April 1988, p. 1.

[136] *The Guardian*, Tuesday 12 April 188, p. 12.

of Arafat in the Emirate (for a meeting of the Islamic Conference Organisation).[137] The movement's growing political reputation and its revolutionary history meant that it could make contact both with governments concerned with the hijacking and with covert groupings in Beirut which Arafat alleged were responsible for organising the hijacking. His assertion (made after the killings had taken place) that PLO mediation would be withdrawn if the terrorists continued to employ violence was, he claimed, made to the Lebanese initiators and was intended to force the hijackers towards a negotiated settlement.[138] Arafat also maintained that the PLO had made possible the transfer to Algeria by contacting the Algerian authorities to instigate action on the flight.[139] Once the departure had been mooted, PLO representatives worked in cooperation with an Algerian delegate present at Larnaca prior to departure for Algiers.[140]

An interesting aspect of the PLO's negotiating position is the group's claims, initially made unofficially[141] then later openly declared by Arafat, that organisational involvement for the planning of the incident had come directly from the Iranian government[142] - an uncorroborated but at least feasible scenario, bearing in mind the Iranian domestic power struggles which were developing throughout the late 1980s. It is conceivable that, for example, some politically influencial factions intent on destablising Rafsanjani's fragile power base might have been able to assist the Shi'ite fanatics in planning their hijacking. Arafat's blatant and grave accusations against the Islamic Republic as a whole may have been based on high-level PLO intelligence or might have been made in order to distance the Palestinian movement from what was exclusively a militant Shi'ite dispute with an Arab state. They might alternatively be viewed as having been primarily a PLO expression of solidarity with the friendly Kuwaiti government, which firmly believed that Iran was not innocent in the matter and which would have been grateful for any external support in this belief. As with the true position of official Iranian authorities and factions, the PLO's motivations and justifications for issuing its statement on Iranian involvement cannot be determined from available source material.

3.3.7. Algerian Authorities

Where earlier efforts to negotiate a surrender had failed, Algeria succeeded in winning the confidence of the terrorists, partly because of the nation's revolutionary credentials, coupled with its recent

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[137] *The Daily Telegraph*, Monday 11 April 1988, p. 1.

[138] *The Guardian*, Wednesday 13 April 1988, p. 1.

[139] *ITN, Channel 4 News*, Tuesday 12 April 1988.

[140] *ITN, Channel 4 News*, Tuesday 12 April 1988.

[141] *The Scotsman*, Tuesday 12 April 1988, p. 1; *The International Herald Tribune*, Wednesday 13 April 1988, p. 2.

[142] *The International Herald Tribune*, Thursday 14 April 1988, pp. 1 and 7.

tradition in such hostage crises,[143] and partly on account of Algeria's dogged refusal to be bound by any of the international agreements on judicial action which had been drafted by ICAO. In short, the state had acquired a well-founded reputation as a clearing house for similar terrorist hostage incidents in the past and was thus an obvious choice for all parties, as a suitable terminus for the hijacking.

The success of the Algerian policy rested on the condition that a peaceful solution would be found in which the terrorists would avoid the use of violence while high level diplomatic efforts took place to organise free passage from Algeria for the hijackers, in exchange for the release of the remaining hostages.[144] Details of a provisionally agreed plan were revealed by Cypriot and PLO officials around the time of the flight from Larnaca,[145] but the envisaged deal involving immediate hostage releases collapsed on arrival at Algiers when the hijackers decided to revert to siege tactics and demand once more the freedom of the 17 prisoners in Kuwait.[146] It is impossible to determine from available information whether this apparent policy change was precipitated by external orders received by the hijackers, a deliberate attempt to try one final time to intimidate a host government into pressing for the release of the 17, mere caprice on the part of hijackers or some other factor.

At this point the proven negotiating skills of the Algerians entered the scenario. Instead of merely overseeing the releases and then channelling the hijackers out of the country in a secretive and unobtrusive manner, as could have been confidently predicted,[147] officials were forced by the belligerent hijackers to bargain with them while hostages continued to suffer on board and media attention continued to be focussed on the case. From the time of Interior Minister Khediri's first meeting on board the aircraft it was clear that the hijackers would endeavour to cooperate with their new hosts. While on the jet the minister received an undertaking that the gang

[143] Algeria had previously been instrumental in negotiations to free US hostages in the Tehran siege of 1979 - 81, in the TWA hijacking of 1985 and (to a lesser extent) in western hostage crises in Beirut.

[144] See the statement of Algerian Ambassador to Kuwait, El-Hasnaoui Khaldi issued in the Emirate. *The Financial Times*, Thursday 14 April 1988, p. 1; *The International Herald Tribune*, Thursday 14 April 1988, p. 7.

[145] *The Scotsman*, Wednesday 13 April 1988, p. 1; *The Guardian*, Thursday 14 April 1988, p. 8; *The Financial Times*, Wednesday 13 April 1988, p. 1; *The Independent*, Thursday 14 April 1988, p. 1; *The Times*, Thursday 14 April 188, p. 1.

[146] *The Independent*, Thursday 14 April 1988, p. 1.

[147] Note that by the time of the 747's arrival at Algiers, local officials had prepared two aircraft and sufficient hotel rooms for the hostages, probably in anticipation of an early end to the siege. *BBC, Breakfast Time*, Wednesday 13 April 1988; *ITN, Channel 4 News*, Wednesday 13 April 1988.

would "try to be very calm" and avoid violence.[148] Then, on his departure, he was seen shaking hands with a terrorist,[149] as though some measure of basic understanding had been secured initially.

The most important concession granted by Algerian authorities to the hijackers was the press briefing which took place during a particularly uneventful time of negotiations. Although familiar demands and warnings were made in the ten minute statement, two crucial errors were made by the hijackers, indicating that while they may have been dissatisfied with the pace of developments and their prospects of ultimate success, they remained largely content with the efforts of their hosts and were prepared to wait at the airport for their eventual release. First, the briefing spokesman failed to tie his demands to any time scale,[150] thus reducing his demands to mere rhetoric, and second, he indicated in reply to the only question asked by the journalists that fuel would only be required for departure once "a settlement" had been formulated.[151] For over three more days the hijackers waited for the Algerians to implement escape arrangements, never losing patience with officials despite their apparent lack of urgency.

One benefit to negotiators in prolonging the incident without granting concessions on the substantive demands was that the effects of heat, exhaustion, illness, poor sanitation and failure could be allowed to operate on the hijackers, occasionally being encouraged by the Algerians. Also, by allowing the hijackers to continue their siege into the festival of Ramadan, negotiators deployed external pressure upon the gang which had previously shown signs of religious devotion. For the group to continue the incident in already inhuman conditions and suffer the added restriction of a ban on eating and drinking during the hours of sunlight, would have required commitment and stoicism almost beyond endurance. When the Algerian Foreign Minister Ibrahini returned from a secretive mission to Libya and met the hijackers,[152] it is most likely that they did not need to be convinced of the terms offered by him to end the siege a few hours later.

In contrast to Iran's strict filtering of news information and Cypriot authorities' openness to allow unfettered press activity, Algerian authorities were comparatively secretive about progress, with little regard being paid to the press presence at the airport. Often no statement was made to journalists following discussions on board, with no comment passed on matters of speculation. Whereas the identity of key negotiating participants had become known early in proceedings at Larnaca, Algerian negotiators followed the Iranian approach, maintaining a higher degree of anonymity, with few details of their official role becoming known. Most importantly in this respect,

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[148] *The International Herald Tribune*, Thursday 14 April 1988, p. 7.

[149] *ITN, Channel 4 News*, Wednesday 13 April 1988.

[150] *The Independent*, Tuesday 19 April 1988, p. 1.

[151] *The Observer*, Sunday 17 April 1988, p. 1.

[152] *The Guardian*, Thursday 21 April 1988, p. 21.

authorities were able to conceal the identity of a "very important person"[153] (Ibrahini) mentioned in communications with the hijackers until his responsibilities had been discharged. Even after the release, however, the nature and purposes of Ibrahini's visit to Tripoli, as well as the content of his discussions with the hijackers, were never disclosed. Such concern for secrecy was made known at the outset. From the time of Khediri's first contact with journalists it became clear that information would not be supplied to the media which might "complicate and compromise" governmental efforts to reach a solution.[154]

The Algerians' success in ending the hijacking was remarkable in that the government knowingly risked widespread international condemnation from the start by ignoring respected international norms which it correctly viewed as inhibiting the achievement of its objectives - the saving of hostages' lives and the defeat of the terrorists on their principal demands.[155]

3.3.8. Passengers and Crew

Central to the negotiators' understanding of the hijackers' strategy was the intelligence gathered from information received in debriefing sessions with liberated hostages.[156] Even on the first day authorities became aware of the condition and location of hostages, of the approximate number of hijackers active on board and of the fact that they were armed with handguns and explosives.[157] With the mass releases of Mashhad and the various debriefings which followed, information concerning the psychological techniques employed against passengers was obtained,[158] enabling crisis managers to assess the characteristics of the team and recommend responsible actions to those engaged in negotiations.

Only when passengers started reporting the appearance of new gang members and more effective armaments at Mashhad,[159] did the validity and accuracy of their observations become issues of international political significance, for until that time intelligence retrieved had been used to confirm suspicions and beliefs framed in the minds of observers. The accusations from released hostages of Iranian involvement were unusual in that they could not be substantiated from

[153] *The International Herald Tribune*, Wednesday 20 April 1988, p. 2.

[154] *The Times*, Thursday 14 April 1988, p. 22.

[155] *The Financial Times*, Thursday 21 April 1988, p. 4.

[156] For an interesting account of life on board the aircraft during the early stages of the incident, see D. Carew-Jones, "The Hijacking of KU 422: A Hostage's Account," *TVI Report* 8(3) (1989), p. 47.

[157] *The Guardian*, Wednesday 6 April 1988, p. 1.

[158] *ITN, Channel 4 News*, Friday 8 April 1988.

[159] *The International Herald Tribune*, Thursday 14 April 1988, p. 1; *The Independent*, Thursday 14 April 1988, p. 1.

any other source and so could not easily be proved beyond reasonable doubt to have been accurate.[160]

With an aircraft the size of a Boeing 747, it is impossible to state categorically that a second division of hijackers had not always been present, distributed throughout the large, sparsely-filled jet,[161] although successful concealment of weaponry and equipment would have been somewhat more difficult to achieve. In any case, even if passenger evidence strongly suggested that accomplices and supplies had indeed been infiltrated at Mashhad, it would be difficult to establish beyond reasonable doubt that Iranian governmental or factional support was being exercised as opposed to a sectarian conspiracy existing involving, for example, assistance from groups of individual officials, members of the revolutionary guard or others able to provide support on the airside of the airport.

Information received from passengers strongly suggests that security measures at Mashhad were inadequate to prevent infiltrations of supplies to the hijackers. Notwithstanding this point, and even assuming that further firm evidence of collusion in Iran could be called upon, it remained most unlikely that governments would connect the tenuously linked strands of information supplied by passengers in order positively to punish the Iranian government, either for active complicity or for passive negligence. Hence, the value to the case of passenger information lay in its general, informative qualities rather than its practical, evidential uses.

3.4. Effect of International Standards on Conduct of Crisis

The complex facts of the hijacking and the demonstrably large range of crisis skills exhibited so proficiently by the hijackers made any peaceful ending to the hijacking a very difficult objective to pursue. When, however, it became certain that the Algerian government would become involved in negotiations, such resolution became more likely, though at the expense of the Hague Convention's implementation against the offenders. In such circumstances, it was not possible for the Hague Convention's provisions to be invoked as this would have required the Algerian government to have resiled upon the agreed terms of its agreement struck with the gang. There are strong moral grounds for arguing that any such agreement (even when made in good faith) could have been renounced on account of outstanding crimes collateral to the principal offence of hijacking. For example, if prosecution for the act of hijacking itself had been deemed inappropriate or in any sense unfair, arrests of the entire team in order to investigate the two murders or the detention of the hostages could have been reasonably carried out after the surrender of the hijackers.

[160] Although several sources point to infiltration of weapons, supplies and extra personnel at Mashhad, details remain uncertain. *The Guardian*, Thursday 14 April 1988, p. 19; *The International Herald Tribune*, Thursday 14 April 1988, p. 1; *The Independent*, Thursday 14 April 1988, p. 1; *The Glasgow Herald*, Thursday 14 April 1988, p. 1.

[161] *The International Herald Tribune*, Friday 22 April 1988, p. 2.

For the Algerians, however, it was essential that the agreement struck with the hijackers should be honoured, as conduct reflecting a lower standard of concern for the integrity of the bargain would have detracted from a record of impartial non-alignment in such hostage cases involving industrialised governments and radical Islamic groups. For such an important reputation to be sustained, non-conformity to multilateral standards on detention, extradition, prosecution and punishment was essential for fear of losing the trust of the terrorists with whom Algerian officials openly dealt. For this reason, the basic provisions of the Hague Convention (contained in Articles 2, 6 and 7) could not be applied by any Algerian administration conscious of the need to preserve its unique role for future mediation efforts.

Article 9's exhortation to Contracting States (in the plural) to take "all appropriate measures to restore control of the aircraft to its lawful commander" was undoubtedly followed by the concerned governments (which displayed a genuine interest throughout to avoid violent destruction of the aircraft and its occupants) in ending the hijacking.[162] The hijackers' advanced control techniques and their bargaining successes required that the Convention's *aut dedere aut judicare* provisions would never be imposed subsequent to capture. Such flagrant neglect of promulgated standards was both foreseeable and justifiable when viewed in the working context of the international norms concerned.

Around the time of the Hague Convention's creation, Algeria was regarded internationally as a pariah for its openly espoused policies of non-cooperation with aviation powers and its support for fleeing hijackers.[163] Its isolationism totally undermined the rationale of the Hague formula, which predicated its objectives of deterrence (and thence of suppression) entirely upon there being no hiding place for the guilty. It is obvious that total adherence to the norms involved in the Convention would, indeed, be essential were they ever to

[162] It is interesting to note in passing that the required policy of allowing departure at Mashhad and Larnaca met with a degree of disapproval internationally. Indeed, in June 1988, the ICAO Council adopted a policy statement to accompany the existing Assembly Resolution A26-7 (on refusal of landing rights to hijacked aircraft) which sought to dissuade states from facilitating hijack departures. Inevitably, however, the statement's language was tainted with uncertainty, in recognition perhaps of the difficulties faced by Iran and Cyprus. In its fourth resolving clause, it stated that the ICAO Council:

> "URGES each Contracting State to take measures, as it may find practicable, to ensure that an aircraft subjected to an act of unlawful seizure which has landed in its territory is detained on the ground *unless its departure is necessitated by the overriding duty to protect human life.*" (Emphasis added). ICAO News Release, PIO 7/88.

[163] See the hijacking cases of: 23 July 1968 (El Al B-707); 2 June 1972 (Western B-727) in which Algeria failed to prosecute hijackers who landed in its territory. FAA statistics (listed in bibliography).

discourage offenders from flying outwith its jurisdictional locus. Yet where a standard requires an unattainably high degree of state commitment and action in order to facilitate its objectives, it is clear that such a standard must risk being unworkable in the most difficult - and thus the most important - cases with which it was designed to deal. Such a case can be identified in the inability of the Hague Convention to influence the actions of parties involved in the KU 422 hijacking.

It is indicative of governments' broad unwillingness to take seriously their so-called "obligations" that no effective enforcement measures have been employed to add commitment to intention in the framing of laws on the subject. In legislative terms, the failure of the 1973 Rome Conference endorsed the outer limits of multilateral cooperation in the area of violent air crime. The folly of the Bonn Declaration and subsequent attempts to cooperate against states which fall short of the Hague standard lay in their palpable inoperability in the real world of diplomacy and compromise. It is difficult to determine on what basis such agreements might have been used in the Kuwaiti case, as no government involved can be identified as having both breached the norms concerned and, more importantly, as having done so in a way likely to incur the disapprobation of those states most predisposed to imposing sanctions.

The covert dealings of Kuwait, Iran, Cyprus, the PLO, Algeria, Libya and others on the fringes of the incident demonstrate the intricacies of "hijack diplomacy," making liability for collusion and support difficult to establish and impossible to use for any punitive purpose. Throughout the hijacking, condemnation of Iran was commonplace yet no proof of complicity was ever presented by governments with a serious view to punishing the state. Only Algerian action in freeing the terrorists presented both an obvious set of circumstances indicating direct compromise and an easy opportunity for western governments to call for sanctions imposition. This simplistic and inequitable recommendation derived from these governments failure to recognise the importance of pragmatism in the operation of treaty law of this kind. With the legal norms of ICAO being challenged by the determined and practical opposition of the hijack team, it should only have been expected that the standards would become embarrassing impediments to finding an acceptable solution. Of course, it is beyond doubt that the rule of law is made to suffer whenever a hijacker is set free in such circumstances, but it is necessary to concede that the rule of law's effectiveness must always be strictly constrained by the bounds of political feasibility.

The United Kingdom's Prime Minister, Margaret Thatcher, remarked shortly after news of the hijackers' escape had become known that such practices "would only lead to more hijacking and more hostage-taking,"[164] while the Minister of State at the Foreign and Commonwealth Office, David Mellor, noted "very great concern" at the releases.[165] For the United States, Secretary of State, George Schultz, said the hijackers' liberation would breach international

[164] *The Glasgow Herald*, Thursday 21 April 1988, p. 1.

[165] *The International Herald Tribune*, Thursday 21 April 1988, p. 2.

standards and would not be "a proper thing to do."[166] Such attitudes evade the fact that detention and punishment of the hijackers would not have been a viable option for the pragmatic Algerians whose objectives differed so markedly from those who criticised them. The eventual proof that Algeria's actions had been vindicated came in the weeks following the incident, when no punitive measures were imposed on Algeria by members of the international community. Initial statements from Thatcher indicated that any diplomatic and economic action against Algeria would wait until the full facts of the case had become known.[167] On this point Mellor noted:

> "I think it's too early to say what we can do but obviously there will be a number of countries who are as dedicated as we are to the fight against international terrorism who will want to discuss this."[168]

He added that no-one "should underestimate the concern that I think many of us will have about this matter."[169] Within one week, Mellor's superior, the Foreign Secretary, Sir Geoffrey Howe, presented a plan to his Foreign Ministry counterparts on the European Communities' Council of Ministers. Among other proposals, the submission called for imposition of economic sanctions upon Iran, Cyprus and Algeria - a suggestion which received little support.[170] The plan failed to overcome the diplomatic apprehensions and economic concerns aired on such occasions by governments which fear either the response of their trading partners or simply the unknown.

As weeks passed, it became evident that world powers were content to allow the issue gradually to fade from the attention of the media and before long to lapse from the public's short memory. No government was prepared to criticise the Algerians in the long term because it was impossible to escape the deduction that they had done what had been entirely required of them and had done so most effectively for the common good. In view of this reality, it would not only have been manifestly inequitable to have charged Algeria with engineering a dubious outcome of the hijacking, but it would also have been diplomatically and politically inadvisable, bearing in mind the pressing need for western states to maintain good relations with this pivot of dialogue in the Arab world and remembering also Algeria's potential for use in future crisis management incidents. McWhinney's description of the machinations of governments is appropriate in this context:

> " ... governments, weighing the nuisance, in terms both of national prestige and also the tranquil operation of national commercial airline service, constituted by hijackings, can always

[166] *The Scotsman*, Thursday 21 April 1988, p. 8.

[167] *The Glasgow Herald*, Thursday 21 April 1988, p. 1.

[168] BBC, *Six O'Clock News*, Wednesday 20 April 1988.

[169] *Ibid.*

[170] *The Daily Telegraph*, Tuesday 26 April 1988, p. 10.

> trade off some potentially quite effective control measures directed against delinquent countries that harbour or protect or otherwise sponsor hijackers, against the need to maintain friendly relations with those countries who may be useful or vital to them for military-strategic, diplomatic, or general commercial reasons."[171]

The best case that could be made against the Algerian practices is that they served to further the long term cause of global terrorism in all its forms by ridiculing established global standards, showing how weak the international order can be and encouraging further, possibly even more horrifying, incidents in future.[172] This argument could not, however, overcome the truth which underpins it, that physical symbols of the world order are incontrovertibly weak and positively open to attack by terrorist groups at any time. In these circumstances the part played in the hijacking by Algeria is analogous to a safety valve, acting to diffuse the unbearable increase in diplomatic pressures in order to return the machinery of which it is a part to its fragile equilibrium. The prospect of this component being brought into use is unattractive, yet an implicit recognition of the need for its existence is absolutely essential if the mechanics of the apparatus are fully to be understood and applied. The otherwise unprotected machinery of law requires this form of support, at least until there exists another means by which it can be reinforced. In short, the intervention of the Algerian government proved essential for order to be retrieved from the chaotic legal, political and human ordeal brought about by the hijackers. As Clutterbuck remarked on the release of the hijackers following the conclusion of the incident:

> "In a perfect world, of course, it would be far better if they hadn't been released but I think that would have been too much to expect of the Algerians, who I think have done a fantastic job. They've achieved all that possibly could be achieved."[173]

Until governments admit that their universally agreed suppression regime cannot be sufficient to counter terrorist trends, there can be little hope of developing new and more effective norms to suppress aviation offences. In current practice, however, authorities seek only to continue their reliance on the outdated and failing structure of agreements. As Cheng has noted (see above),[174] the Hague formula has acquired a new and highly damaging purpose as a public relations tool with which states seek to prove their concern and demonstrate their commitment to action in the field of aviation terrorism. In fact, far from being concerned and committed, they remain largely apathetic to the changing needs of airlines and their passengers, as shall be demonstrated in forthcoming Chapters. An important lesson of the KU 422 incident must be that terrorism suppression will not derive from governments merely showing their outrage or declaring their

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[171] McWhinney (1987), p. 89.

[172] *The Glasgow Herald,* Thursday 21 April 1988, p. 1.

[173] BBC, *Six O'Clock News,* Wednesday 20 April 1988.

[174] Cheng in Cheng and Brown (1989), p. 45.

opposition to the crimes concerned. Equally, the faltering and sporadic quest for the *aut dedere aut judicare* ideal cannot alone be trusted to provide any timely solutions. In addition, appropriate practical measures must be developed.

3.5. Conclusion: The Need for New Directions in Violent Air Crime Suppression

The KU 422 hijacking demonstrated the failures of the Hague formula and indicated that additional means of containing the incidence of air crimes must be sought by states, independently and in concert, and by the industry itself. One key purpose of the following Chapters is to introduce the discussion of global aviation security enhancement as an activity of principal importance in the search for new directions in air crime suppression. It is suggested that the terrorist ills of the industry, which have not been and will not be cured by resorting to administrative cooperation, might at least be more likely to be prevented at many sensitive locations with the imposition of adequate security measures.

As discussion of aviation security proceeds, it will become evident that even in this field many difficulties (such as those of technology, resources and cooperation) will require to be overcome, if the terrorist loopholes of the existing regime are to be filled with any degree of sufficiency. On the other hand, it is also correct at this stage to stress the great benefits which adequately formulated security could provide as a reward for swift and diligent action. Foremost of these benefits is the predictable decline in the number of cases of severe air crime which a progressive and on-going policy of global security enhancement could entail. Greater efficiency in the security techniques used could result in a higher percentage of attempted terrorist acts being intercepted prior to their implementation, recognising that terrorists often display both an ability to adapt their modes of attack to suit changing response conditions and that improvement of security in one venue or sector of the industry will often serve merely to reveal "softer" targets elsewhere, which can then become prime candidates for terrorist attack.

Another possible advantage involved in improving security within aviation is the deterrent effect of visible, high quality preventive mechanisms. While the Hague formula is powerless to deflect the most determined of prospective offenders prepared to challenge its administrative provisions, it is undeniable that a practical improvement in security throughout the world's airports would provide a more difficult physical barrier for them to overcome than is currently being experienced, in turn forcing them to reconsider their means of attack. It is conceivable that in such circumstances an otherwise unattained deterrent effect could be achieved, as a proportion of would-be air criminals would be likely to turn their attentions to different types of target displaying lower levels of security preparedness.

Before discussing in detail the issue of airport security, it is necessary to isolate certain recent factors which have prompted new passenger interest to be taken in the field, looking particularly at the media interest generated by the Lockerbie atrocity of December 1988.

3.5.1. Airport Security: The Forgotten Factor

Amid media analysis of the KU 422 hijacking, the vital question of how the incident had initially been allowed to commence was largely ignored, the defensive weakness at the root of the crisis - grievously poor airport security - going unchallenged by both journalistic investigation and public declarations from the major aviation powers. The Thai government's official investigation which was initiated very shortly after the Boeing's seizure, revealed no security lapses to have taken place during the period between its arrival at Bangkok International Airport (BIA) at 1107 on Monday 4 April 1988 and its departure at 0351 the following morning. In total, three independent investigations took place, each commissioned by separate Thai Government agencies, yet no definite conclusions were reached by any.[175]

Certain of the findings outlined in the official Thai *Fact Finding Report on the Seizure of Kuwait Airways Flight KU 422* left considerable room for doubt that adequate investigation had been made. For example, the report openly admitted that "Flight KU 422 departed from BIA for Kuwait. The aircraft was seized during its flight operation without any stopover..." but then conceded only that it was "believed that the hijackers enplaned at BIA." Also, the Report noted that in the sixteen hours of the aircraft's visit to Bangkok, it was handled by 22 cabin cleaners, two kitchen personnel, more than three maintenance officers and more than two luggage and cargo handlers.[176] Although these staff members were reported to have been physically searched by security officers and to have been under the supervision of Kuwait Airways security personnel, the fact remains that a sufficiently large cache of arms and explosives might have been allowed to evade pre-boarding search procedures on the ramp at BIA, to have been placed on board by one of the uncertain number of airport staff.

Whichever means were employed to place the terrorists' first consignment of weaponry on board, the official report failed to note the possibilities which undoubtedly existed for BIA to have been at fault. Little of substance has emerged publicly since the breach to point to the nature of the infiltration, although the US State Department has observed that it is possible "that because of the lateness of the hour, a thorough secondary inspection of passengers and hand-carried luggage had not taken place on boarding."[177] These allegations have been corroborated by passenger evidence on the condition of passenger screening at Bangkok at the time of the incident. One traveller who was interviewed on British television described how he was able to pass through security processes without a piece of metallic photographic equipment, which very closely resembled a handgun in profile, being detected:

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[175]US Department of State, *Patterns of Global Terrorism: 1988* (Washington: US State Department, 1989), p. 41.

[176]Airports Authority of Thailand (1988), pp. 2 - 4.

[177]U.S. Department of State (1989), p. 41.

> "I flew out of Bangkok on the same day as the hijacking. Security was not good. The security screening was right by the gate where you go into the aeroplane rather than just after passport control. Now passengers don't go into a plane in a nice convenient flow and when I got to the gate there [were] a hundred people all crowding round. The security girls all wanted to get us through very quickly and I took that with me...It's a collapsible tripod. It's made of metal and it was in my hand luggage and it was not picked up at all."[178]

At the time of the hijacking, the moderate degree of media attention which had been engendered by the far distant hijacking was focussed on the newsworthy plight of the hostages and the uncertainties of the mediation processes, providing little coverage of the equally important, though far less dramatic, security issue. By the time of its resolution, after over two weeks of predictably diminishing news attention, public interest was waning markedly in the tiresome and hackneyed predictions and commentaries. As a result of the combination of an information void suffered or engineered by the Thais and Kuwaitis and a need to find new and exciting pieces of world news elsewhere, the vital question of Bangkok's security was permitted to lapse from the public mind.

Had the flight involved a high proportion of US citizens or had it started at an airport of an economically developed state in, for example, Europe or North America, where a security breach might have sparked general public anger and media interest in the issue on its own account, attention might have been concentrated on the weaknesses rather than have declined. Evidence for this assertion is to be found in the Press activity during the TWA hijacking to Beirut in June 1985, when a very similar terrorist *modus operandi* resulted in much more intensive US Press activity involving aviation security.

Also, following the terrorist attack of Pan Am Flight 103, which occurred only nine months after the Kuwaiti hijacking, the clearly visible western identity of the victim passengers, crew and airline resulted in prolonged media interest. The strong western demand for information on the atrocity, coupled with the sheer enormity of the criminal act perpetrated, led journalists and passengers to contemplate in detail the nature and extent of the risks facing European and North American travellers, in turn forcing them to investigate not only the tactics used by the unknown terrorists but, more directly, the shortcomings of industry and state preparedness.

In the months immediately following the Lockerbie disaster, the previously protected myths of security excellence were progressively dismantled first by journalists intent on disclosing the easily identified weaknesses in the global aviation security network, and then by security experts themselves, testifying to official public hearings or simply choosing to enter the general security debate which was inevitably bound to follow Flight 103's sabotage.

Hence, 1988 witnessed the transformation of security ineptitude and

[178] *Kilroy*, BBC 1, Wednesday 13 April 1988.

inadequacy from a badly understood and often ignored factor in aviation terrorism to a journalistic subject firmly rooted in the public domain. While governments continued to note their pride at the increasingly broad sweep of the *aut dedere aut judicare* doctrine in relation to crimes of air violence, aviation terrorists demonstrated the true extent of state concern for airline passengers by penetrating the very defences of the industry which government agencies sought to regulate and control. It is ironic that the year started with ICAO member states framing and applauding a largely token extension of the Hague formula, continued with an incident which negated its key principles and ended with terrorists proving the norms' utter powerlessness to prevent sophisticated acts of terrorist outrage from being committed.

CHAPTER 4

AIRPORT SECURITY: PRACTICES AND PROCEDURES

> "In retrospect, the surprise must be why it took so very long - until the beginning of 1973 - to institute such simple and (as was soon demonstrated) effective preventive controls over aerial piracy. What combination of governmental bureaucratic inertia or sheer lack of imagination and foresight, and of economic and other pressure group stalling tactics, was responsible for losing more than a decade in successful community problem-solving?"[1]
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> "The dilemma of terrorism is that although most governments and people recognise the dangers of terrorism, they are unwilling or unable to take the necessary steps to control it."[2]

4.1. Introduction: History of Airport Security in an Age of Violent Air Crime

Following from previous Chapters' analyses of the weaknesses of the current international legal regime, this Chapter deals with practical means of violent air crime suppression through the adoption of airport security measures. It discusses the key issues of relevance to airline passengers, concentrating on the security methods traditionally used to screen passengers and their baggage prior to flight, the problems faced in adapting these techniques to new forms of threat and the need to introduce the responsible employment of high technology into airports' security operations.

Aviation security in its totality must always comprise a broad portfolio of defensive techniques to accompany considerations of facilitation (operational efficiency in processing flights). The intention of this breadth of activity should be to provide an overlap of its various constituent elements, forming a strong but constantly evolving structure of operations, designed to promote absolute "security sterility" around otherwise vulnerable prime targets. Airport security activities involve processes which have developed as a result of passenger and industry concern and governmental intervention largely since the early 1970s, when aviation hijacking was first perceived as requiring a systematic approach to be taken in employing preventive measures for its suppression. The impetus for security activities to be introduced was also motivated by the rapid expansion in civil flight activities around that time, resulting in

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[1] McWhinney (1987), p. 119.

[2] Y. Alexander and H.M. Levine, "Prepare for the Next Entebbe," *Chitty's Law Journal* 25 (1977), p. 240.

new passenger throughput pressures being experienced at large airports.

In the United States, the late 1960s and early 1970s witnessed an alarming increase in the number of US registered civil aircraft being hijacked, mostly to Cuba, with which no agreement on rendition of offenders had by that time been reached. Meanwhile, in Europe, the development of Palestinian aviation terrorism was causing concern among the governments of leading aviation states and among all international airlines. The politically significant and deeply embarrassing events surrounding the "Dawson's Field" multiple hijackings of September 1970 and the unexpected terrorist sabotage on 21 February 1970 against a Swiss Air Coronado in which 47 persons were killed, resulted in authorities realising both the political significance and the vulnerability of aviation in a new age of terror violence.[3]

A subsidiary consideration was the advent in 1969 of the first operational Boeing 747 aircraft, heralding the general introduction of wide-bodied airliners, capable of carrying an unprecedented number of passengers and in danger of becoming a prime target both for hijackers' sieges and for saboteurs' explosives. This development alone was described by Dorey as "a seemingly insoluble security handling problem,"[4] and served to focus the attention of policy makers and aviation authorities on the issue of terrorist capacities. Although the Hague and Montreal Conferences sought to deal with the problems on a political-legal level, there was also a growing realisation that some practical measures were required to cope with what appeared to be the progressive development of several related, though not yet properly identified, threats. By the late 1960s, the Israeli carrier, El Al, had introduced systems of passenger screening and was leading the market in an unenthusiastic race for new security techniques.[5]

Meanwhile in the United States, the richer carriers were voluntarily introducing passenger searches and elementary electronic screening of baggage on certain flights.[6] President Richard Nixon's initial response to the problem was to introduce security into American airports on an optional basis at first, in the latter half of 1969,[7] then on a mandatory basis for all passengers under a rule promulgated

[3]FAA statistics (listed in bibliography).

[4]Dorey (1983), p. 220.

[5]Dudley (1976 - 77), p. 68.

[6]McWhinney (1987), p. 82. For a useful description of early, voluntary measures contemplated or introduced by carriers, see Fick, Gordon and Patterson (1969), pp. 80 - 83. The development of the US federal security system is charted in Moore (1976), pp. 8 - 18. See also R. Clutterbuck, *Guerrillas and Terrorists* (London: Faber and Faber, 1977), pp. 103 - 105.

[7]Dudley (1976 - 77), p. 68.

on 5 December 1972 and brought into effect on 5 January 1973.[8] For him, the precipitating factor which necessitated activity by airports and carriers was a pair of unusually violent hijackings to Cuba by fugitives in October and November of 1969.[9]

In September 1970, following the Dawson's Field hijacking incident, a decision was taken by the US Administration to order the introduction by the US Customs Service of 1,500 Customs Security Officers - trained guards, known as "sky marshals" - whose role would be to accompany passengers on board high risk flights, partly to deter would-be hijackers and partly to counter the threat of diversion if it was presented.[10] Although carriers of some states (most notably Israel, Pakistan and Egypt) still employ such staff for certain flights, their impact has not been regarded as having been decisive against hijackings.[11] Michael J. Fenello, a Vice President of Eastern Airlines stated in 1973 that in addition to having been "unbelievably expensive" the US pioneering sky marshal programme did not result in any in-flight arrests being made.[12]

Dudley has noted that many experts within the industry were worried by the trend of introducing armed staff and were "relieved to watch it gradually fizzle out."[13] Even the Soviet airline and prime target for refugee hijackers, Aeroflot, has decided to revise its policy of arming its flight personnel to conform with new regulations to be contained in the USSR's Air Traffic Code.[14] Experience has taught airlines that armed sky marshals can themselves pose a serious risk to aircraft, crew and passengers. Evidence suggests that an in-flight gun battle between guards and Lebanese hijackers may have been responsible for the destruction of an Iraqi Airways aircraft over

[8] B.O. Davis Jr, "Skyjacking: Problems and Potential Solutions - A Symposium - The Government's Response to Hijacking," *Villanova Law Review* 18 (1973), p. 1014; McWhinney (1987), p. 82; J.J. O'Donnell, "Skyjacking: Problems and Potential Solutions - A Symposium - Air Crimes - Perspective from the Cockpit," *Villanova Law Review* 18 (1973), p. 992 - 993.

[9] Davis (1973), p. 1012 - 1013 and p. 1015.

[10] Bell (1975), p. 1332; Dawson (1986) II, pp. 33 - 34.

[11] E. O'Ballance, *Terrorism in the 1980s* (London: Arms and Armour Press, 1989), p. 117.

[12] M.J. Fenello, "Skyjacking: Problems and Potential Solutions - A Symposium - Individual Rights v. Skyjack Deterrence: An Airline Man's View," *Villanova Law Review* 18 (1973), p. 999.

[13] Dudley (1976 - 77), p. 68. The US scheme was phased out in July 1972. Dawson (1986) II, p. 34.

[14] *Izvestia*, 25 July 1990, reprinted in Novosti Press Agency press release, July 1990, p. 3.

Arar, Saudi Arabia on 25 December 1986.[15] Although the United States' official civil aviation agency, the Federal Aviation Administration (FAA) re-introduced the concept of Federal Air Marshals in 1980, the role of the staff was markedly more specialised than before, with much greater integration of activities with the industry.[16]

Also in the late 1960s, the option of searching passengers and their hand baggage to detect weapons and other devices which might have been used in hijackings was taken by some carriers, but proved to be impractical on a general basis because of the amount of time needed to frisk each individual and check each bag manually. An important step towards the international introduction of security technology came at the Seventeenth Session (Extraordinary) of the ICAO Assembly, in June 1970, when Member States adopted Assembly Resolution A17-15, requesting the Council:

> "...to cause a further examination to be made, in consultation with States; the World Health Organisation, the International Commission on Radiological Protection and other interested bodies, of the possible use of radiological techniques for identifying weapons on passengers or in their baggage..."[17]

In a short period, technological apparatus was adapted for aviation security purposes and installed at major international airports. While invasive radiological techniques were employed in the X-ray processes for baggage, benign metal detection methods were used for screening humans. Despite the fallibility of the devices and their lack of technical sophistication (see below), the first generation of security machinery was able to detect many weapons which might have been used in hijackings and proved that the advances being made in aircraft manufacture did not, after all, present any insoluble difficulties.

X-ray screening of baggage was introduced as a time-saving alternative to thorough physical examination. It soon demonstrated its capacities as a reasonable mode of metallic weapons detection when operated by a trained security officer, being approximately four times faster than manual techniques.[18] The upsurge in hijacking incidents in the US, coupled with the burgeoning of new technology, prompted President Nixon to instigate in 1973 mandatory security screening throughout US carriers.[19] While this decision was opposed vehemently by many civil liberties campaigners, who regarded mandatory searching of passengers

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[15]For a discussion of the merits of using sky marshals, see McWhinney (1987), pp. 87 - 88.

[16]Dawson (1986) II, p. 34.

[17]Dorey (1983), p. 219.

[18]*Ibid.*, p. 220.

[19]U.S. Department of Transportation, Federal Aviation Administration, *Semiannual Report to Congress on the Effectiveness of the Civil Aviation Security Program* July 1 - December 31 1986, p. 6.

and their baggage as worthy of being ruled unconstitutional,[20] there were strong legal grounds for supporting the measure.

The airlines themselves were reluctant to see their self-regulated, deterrent-based, discretionary modes of screening being replaced by an expensive system imposed and regulated by government.[21] Perhaps for this reaon, the FAA considered ending mandatory security screening only five months after its inauguration, but finally relented when faced with public support for the new security.[22] The methods soon became well established, serving as an example to other states of the importance and applicability of adequate preventive techniques.[23] The Nixon initiative's success was based, in large measure, upon the enterprising approach of Lieutenant General Benjamin O. Davis, the US Assistant Secretary of Transportation and the President's Director of Security, who had been appointed to introduce airport security systems at US airports. As Wilkinson has noted, Davis astutely recognised one of the most important factors in making rigorous security compatible with swift facilitation:

> "The queue had to be at the ticket counter rather than at the search barrier. This was the secret of making the scheme acceptable to the travelling public. And the scheme has been fully justified by its success."[24]

Gutteridge has correctly noted that the effect of precautions imposed to prevent and deter terrorist activities can never be accurately

[20] J.M. Gora, B.O. "Skyjacking: Problems and Potential Solutions - A Symposium - The Fourth Amendment at the Airport: Arriving, Departing or Cancelled," *Villanova Law Review* 18 (1973) 1056; C.J. Nau Jr, "The Antiskyjack System: A Matter of Search - or Seizure," *Notre Dame Lawyer* 48 (1973), p. 1261.

[21] Fenello (1973), p. 1000; McWhinney (1987), pp. 82 - 83.

[22] Rosenfield (1973), p. 82.

[23] The adoption of US techniques in other major aviation powers was not rapid. Note that even in the mid 1970s, it was common for security teams at major European airports to apply security checks on high risk flights to the Middle East. Trelles (1978), pp. 122 - 123.

[24] P. Wilkinson, *Terrorism and the Liberal State* (London: Macmillan. 1986), p. 252. See also R. Clutterbuck, *Living with Terrorism* (London: Faber and Faber, 1975), p. 118; Clutterbuck (1977), p. 104.

measured.[25] As a probable indication of the success of the US initiatives, however, it is interesting to note that between 1973 and 1986 security points at US airports screened almost eight billion passengers and inspected over nine billion pieces of carry-on baggage, with more than 38,000 firearms being detected and almost 16,000 arrests made. The FAA estimates that 117 hijackings or related crimes may have been prevented by security measures,[26] although this should be compared with the figure of 104 hijackings which took place despite the measures, in the same time frame.[27]

Although any analysis of airport security must conclude that the activities involved should be directed in total towards preventing a broad selection of offences, including fraud and theft, the principal group of crimes of interest in the contexts both of academic examination and practical significance is that which comprises the ICAO conventional scheme: hijacking, sabotage of aircraft and airport attack. In the case of the former two categories of crime, protecting the perimeter of the ramp on which aircraft sit, is, or should be, the central feature of activities, for if weapons and explosive or incendiary devices can be stopped from reaching their targets the crimes themselves will often, though not always, be prevented.[28] Because the importance of these two offence groupings has been realised by most international airports of the developed world, security systems have been developed in order to protect the landside/airside boundary from hijackers and, to a much smaller extent, from saboteurs. Very often, however, little has been achieved to prevent attacks taking place within the landside areas of terminals away from aircraft.

The simultaneous assault in December 1985 by Abu Nidal terrorist teams

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[25] W. Gutteridge in Brenchley (1986), p. i. See also Dudley (1976 - 77), p. 73; Flight Safety Foundation, "An Update of World Aviation Security System," *Flight Safety Digest* (November 1989) p. 9. A reason for the general lack of statistical evidence is not difficult to find:

> "The deterrent value of security at airports is obviously considerable, but unfortunately not easily measurable. Detection successes are seldom widely reported as they usually do not make good media copy; and some airports prefer not to publicize such incidents as they tend to unsettle passengers." O'Ballance (1989) II, p. 112.

[26] FAA, *Semiannual Report*, July 1 - December 31 1986, exhibit 6. A revised estimate to the end of 1988 is that 119 US hijackings may have been prevented by the measures. *International Security Review*, January/February 1990, p. 7.

[27] FAA, *Semiannual Report*, July 1 - December 1986, p. 6.

[28] B.H. Vincent, *Statement of Mr Billie H.Vincent Before a Subcommittee of the Committee on Government Operations, House of Representatives, September 25/26, 1989.* Submission to a Sub-Committee of the Committee on Government Operations, House of Representatives, Washington D.C., 25 - 26 September 1989, p. 31.

on Vienna's Schwechat airport and Rome's Leonardo da Vinci airport demonstrated that although security may operate sufficiently well at key international sites to prevent and deter potential aircraft-related offenders, a wide range of worthwhile targets can still be identified in the less well-protected areas of airports which will attract a high degree of public interest and a low level of defensive activity. The positioning of armed guards and surveillance cameras in visible positions may act as a deterrent to some terrorists and certainly achieves a very useful and necessary containment purpose in reducing the capabilities of attackers to maximise destructive possibilities. Nevertheless, in busy airports in which commercial, egalitarian and throughput considerations have to be weighed against the needs of securing vulnerable passengers and staff, a clear preventive dilemma still exists which cannot easily be resolved. After turning to discussion of the nature of passenger-related security activities and their role in a changing aviation market, this important point will be dealt with in terms of improving upon airport design features.

4.2. The Nature Of Aviation Violence

Airline travel is rightly famed for the versatility which it offers its passengers. Such versatility has long been recognised also by those people who seek to disrupt civil aviation by means of violence, for it is true that no other industry offers as large a range of targets and options for terrorists, whether in the form of hijackings, acts of sabotage or armed attack. The industry falls victim to terrorists because it represents an indirect extension of national identity in a global arena. If a small group of terrorists or its state sponsors wish to convey a vivid and clear message of aggression to an "enemy" state, it will always be easier to attack, for example, an unguarded and unprepared airport check-in desk in some far distant location than to engage the government of the state in first-hand conflict on a more conventional form of battlefield. Moreover, the capacity of many airports to prevent adept terrorists from committing their most violent acts remains low, making aviation yet more attractive. These circumstances were recognised by the UK House of Commons Select Committee on Transport, which reported on airport security in 1989:

> "[T]errorists are not attacking on a form of transport which they happen to dislike: the attacks are on the state itself, with civil aviation having been selected as a soft target."[29]

Equally, any dramatic act of aviation terrorism is certain to acquire considerable political and media attention. A well-organised hijacking or, better still, an anonymous act of mass murder in the form of bomb or rocket attack will occupy the minds of Prime Ministers and Presidents and will place doubts in the minds of the travelling public. In truth, aviation terrorism is a low cost, low risk means of waging war, in a global battlefield where defence is not easily achieved and where violent counter-attack is outlawed internationally and, in most cases, is almost impossible in practice. Moreover, the threat of aviation terrorism is faced primarily not by governments and

[29]House of Commons Committee on Transport (1989), p. 7.

their armed forces, but by civilian agencies and ultimately by defenceless airline passengers. It is vital, therefore, to assess the means by which those vulnerable passengers can better be defended, in turn requiring a review of the development of aviation security techniques.

4.3. Passenger Security Processes: Updating False Assumptions

Since the inception of aviation security processes, excessive emphasis has been placed on the prevention of hijackings, classically at the expense of other means of suppression. Indeed, traditionally and typically, airport security, in its operations upon passengers and their baggage, has been geared towards the active removal from the aviation system of hijackers and the inactive control of baggage hold bombers. In practice, the distinction between the active and the inactive approaches has meant that while screening for metallic weapons and for explosive and incendiary devices on passengers' persons and in their hand baggage has become a standard feature for the purpose of preventing hijackings, no such positive screening role has been developed by most airports and carriers to deal with the ever-present threat of sabotage from within hold baggage.[30] The principal reason for this omission has been one of logistics. The rarity of sabotage incidents and the expense and trouble which would be entailed in screening hold baggage have resulted in so-called cost-effectiveness calculations being made to differentiate between "high risk" and "low risk" flight routes. Even the European Civil Aviation Conference (ECAC) established in its security manual of September 1988 a typically pragmatic norm that under usual operating conditions, no extraordinary action need be taken to prevent sabotage via the hold:

> "In normal circumstances there is no requirement to search checked-in baggage, but checked-in baggage should be reasonably protected from interference between the point of check-in and the aircraft."[31]

In September 1989 this provision was adapted to take account of a newly-perceived threat posed by electrical and electronic devices - a classically reactive approach when viewed in light of the previous twelve months' terrorist activity. The manual was also updated to contain the following:

> "In any event, not less than 5% of checked-in baggage should be checked by X-ray, other technical means or manually to determine to the greatest feasible extent that the baggage does not contain an explosive device."[32]

A similar proportion was specified for on-line and inter-line transfer

[30] It has been reported, however, that at least three airlines, Air India, Pan Am and TWA, employ 100 per cent hold baggage screening on trans-Atlantic departures, using both physical searches and X-ray techniques. *The Sunday Telegraph*, Sunday 1 July 1990, p. 1.

[31] ECAC, (1988), paragraph 2.3.3.1.

[32] *Ibid.*, paragraph 2.3.3.2 d).

baggage screening.[33] ECAC's promotion of a minimum percentage of only five per cent indicates the practical difficulties involved in changing the habits of a lifetime for an industry unacquainted with hold-baggage screening. Finding the time, space, manpower and finance to introduce the new form of screening is a very difficult problem to solve and is one which can only be compounded by future growth trends in the industry (discussed below).

Nevertheless, leaving as many as 19 in every 20 bags unscreened in the hold of an aircraft cannot be viewed as an effective problem-solving mechanism for the industry and can come as no comfort to worried passengers. It leaves almost unaffected the scope of terrorists to target innocent travellers and so raises questions as to its intended purpose. If a promulgated minimum baggage search figure had been directed towards isolating terrorists' devices and discouraging their targeting of aviation, that figure would have required to be considerably higher than five per cent. Alternatively, as a safe, easy and unambitious means of showing that some form of action had been taken, the five per cent level would be much more effective and would require minimal disruption to the industry's expansion and profit-making plans. Once more, the desire to be seen to do anything which appeared to be a positive contribution towards security enhancement was allowed to override what little desire may have existed to do something more difficult but potentially more effective.

It is only fair to note that any screening level for hold baggage can carry with it dangers of one type or another, if that screening is not implemented in a responsible way. When, for example, in 1990 one major European state increased its average hold baggage search figure from ten per cent to 33 per cent, one independent security expert privately voiced fears that the overall quality of physical screening would fall. Where previously sorters had been able to take time to identify pieces of baggage which appeared suspicious or more likely than others to require a full inspection, under the new regime the newly over-worked staff merely picked every third bag at random and gave it a less thorough inspection. The expert's assessment of the new scheme was that it failed to address any question of security, that it was a politically appropriate measure designed to convince the public that standards were being improved and that it would not provide any statistically valid probability of protection against baggage bombers.[34]

Neither the frequency of incident occurrence nor the structural upheaval required to bring about improvements can be viewed as valid justifications for inactivity in the field of security reform, because terrorist targeting of aviation can affect any sector of the industry

[33] *Ibid.*, paragraph 2.3.3.3. "On-line" transfer baggage may be defined as items taken from one aircraft to another of the same carrier, while "inter-line" transfer baggage may be defined as items taken from one carrier's aircraft to another carrier's aircraft. In contrast, the term "transit" implies an aircraft landing at an airport, only to depart without transfers being made.

[34] Interview with British aviation security expert, Paris, France, June 1990.

at any time. These criteria, however, are likely to remain the weak excuses for inactivity which the industry employs to fend off public calls for radical change within aviation security - change which should no longer be viewed as a discretionary option for the long term. In practice, only those routes which have been deemed to be in particular danger at any given time will be protected by proper baggage screening. In the United States, in particular, it has been noted that standards of screening are low. Dr Hadi Bozorgmanesh, an executive with a firm which has developed a very promising technology (TNA) described, in February 1990, the extent of the US crisis as follows:

> " ... [We have] discovered that there is an enormous misperception by most international travellers. Passengers are screened and, of course, see carry-on baggage inspected. That appears to lead many to the false impression that all luggage is inspected for weapons and explosives as well. This is clearly not the case.
>
> With the exception of international luggage that is cleared through TWA's TNA facility at Kennedy airport, there is no routine inspection of passenger baggage for bombs."[35]

For one airline, the Israeli carrier El Al, a long-standing danger from radical Palestinian or Islamic terrorist groups has led to a policy decision to adopt human-oriented, defensive tactics on all flights, and so to treat every passenger and every object entering the airport terminal with caution. Some other airlines which have had experience of sabotage, may routinely select certain airports at which to carry out stringent checks on all or a proportion of hold baggage.[36] Most airlines and airports, however, continue to hold an identical view to ECAC, avoiding the general use of hold baggage screening as a principal security technique, if only because customary airport design and facilitation pressures make it largely impracticable. This harsh fact was realised by the British House of Commons Select Committee on Transport in the period between its two reports of 1986 and 1989. In the former report it stated the following:

> "[It] may only be a matter of time before all hold baggage must be screened or searched."[37]

Two and a half years later, after the practicalities of the "post-Lockerbie" security crisis had been assessed in the context of

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[35]H. Bozorgmanesh, *Concerning the Successes of Thermal Neutron Analysis as an Explosive Detection System,* paper presented to the President's Commission on Aviation Security and Terrorism, 2 February, 1990, p. 3.

[36]Interview with Richard Myers, freelance television journalist specialising in conflict and security, Glasgow, UK, 21 November 1989.

[37]House of Commons Committee on Transport, (1986), p. 7.

existing security infrastructure and airport capacity, the Committee modified its recommendation radically:

> "A percentage of hold baggage is x-rayed and searched on certain flights by British airlines. The purpose, according to the Secretary of State is to deny certainty to the terrorist. Whilst not wanting to disclose the exact percentage, it must be clear to any traveller that it falls far short of 100%. We have already commented on the temptation by Governments to let it be seen that "something is being done" and that temptation is by no means restricted to the British Government. Following the Lockerbie tragedy, the FAA advised that all hold baggage on all US carriers be screened. It was an impractical suggestion which caused US airlines not only at Heathrow and Gatwick but around the world to seek waivers.
>
> The Secretary of State was in no doubt as to the seriousness of the capacity problem when it came to screening hold luggage. If all major world airlines brought in such a requirement, `world aviation would come to a halt'."[38]

In response to this observation, it is reasonable to note that while a screening crisis currently exists, problem-solving techniques can be sought through research and development efforts - and should be without delay - so as to enable the industry which now labours under the pressures of time and work to gain a more effective hold baggage screening ability. As technological advances are made and new generations of screening apparatus are brought into service, it is to be hoped that the Secretary of State's assumption will lose credibility.

For the moment, remedial action has been sought by aviation authorities in the form of inadequate compromises. For example, in the wake of the Lockerbie atrocity, the FAA introduced a regulation requiring all flights under its jurisdiction to involve screening of transit baggage by X-ray and other means[39] - an obviously reactive and piecemeal approach to a specific problem. Despite such "patchwork" efforts, two key problems remain. First is the inability of most operational screening devices to isolate the most potent explosive substances, such as plastic explosives (discussed below). Second is the location problem faced by many airports of introducing any extra form of screening for hold baggage - a time-consuming, troublesome and expensive option for most sites. This difficulty is posed, in part, because of pressures exerted on carriers and airports to process a growing number of passengers and their baggage in a space of time which is either fixed or unable to grow at an appropriately swift rate. These two factors are central to understanding the crisis of security which must be addressed.

[38] House of Commons Committee on Transport, (1989), p. 5. In contrast to this information, it is interesting to observe that the Department of Transport announced in the following year that it had set an objective to screen all hold baggage. Department of Transport press release, September 1990.

[39] *The Independent*, Thursday 1 March 1990, p. 1.

Even in some developed nations which hold important economic interests in civil aviation and which can be viewed as political targets of aviation terrorists, the security infrastructure and regulatory machinery which must operate together are now being recognised as incapable of meeting the demands of an industry under threat. At the September 1989 hearings of the US House of Representatives Subcommittee of the Committee on Government Operations, concerned with the condition of civil aviation security after the Lockerbie disaster. Billie H. Vincent, a former Director of the US FAA Office of Civil Aviation Security, noted that "the current U.S. civil aviation security system is seriously deficient."[40]

Also presenting a statement to the Subcommittee was Isaac Yeffet, a former Director General of Security for El Al airlines, who described visits which he and a journalist had made in January 1989 (immediately after the sabotage of Pan Am Flight 103) to seven major US airports. Referring to the quality of security at La Guardia, New York; O'Hare, Chicago; Stapleton, Denver; Miami International; San Francisco International; Los Angeles International; and John F. Kennedy, New York,[41] he made the following comment:

> "We found that, while vast sums are spent on guards, machines and equipment, there is virtually no security provided [at] any of these airports. They are open targets, waiting, unprotected, for any lunatic or terrorist who wants to capture the day's headlines. American airline security does very little well."[42]

A principal organisational problem which has not yet been addressed by many authorities concerned with security deals with the issue of procedural stagnation. In the two decades since screening of passengers and their hand baggage was introduced on a general scale, terrorist tactics and abilities have developed while detection capacities and procedures have remained largely static. It is remarkable that authorities and the industry can continue to permit outdated and obsolescent processes to be employed, when they should be aware that radically new threats require a radical reappraissal of security capacities. Explanations for this complacency are not easily found, with several possibilities existing. Perhaps policy makers and managers have permitted their attitudes and activities to adapt to the techniques of the past and have become entrenched in rigid policy frameworks or stultifying routines, perceiving no increased threat to the security procedures which have in previous years proved successful at finding metallic guns and identifiable bombs.

It is possible that persons in authority have actually recognised that threats are changing but have either calculated that their airports are a low risk venue for attack or are prepared to increase the

[40] Vincent (1989), p. 1.

[41] I. Yeffet and E. Barnes, "No Airport Security in the U.S. is Safe." *Life* March 1989, pp. 133 - 136.

[42] I. Yeffet, Untitled submission to a Sub-Committee of the Committee on Government Operations, House of Representatives, Washington D.C., 25 September 1989, p. 1.

magnitude of security without introducing expensive and inconvenient advances in quality which may be required. Alternatively, at a time when swift passenger facilitation is becoming increasingly important and even short delays in terminal procedures can render timetables and schedules useless, it is not unlikely that some airport managers are avoiding the introduction of new and slower techniques, relying instead on what might be termed a "philosophy of Russian roulette."[43]

Instead of employing hold baggage screening, procedural techniques have sometimes been used to reduce the chances of baggage hold bombers reaching their targets. Unfortunately, their effectiveness has, in recent years, been placed in question by the progress of and success achieved by aviation saboteurs. The practices, analysed below, can be simple in operation, relying on observation skills and adherence to standard facilitation procedures.

4.4. Security Techniques

4.4.1. Baggage Reconciliation

It is universally recognised that passengers and their hold baggage should not normally be separated from their jointly allocated aircraft at any stage of a journey,[44] as such a situation could be capitalised upon by saboteurs who could plant explosive devices in hold items and then leave the flight at some stage prior to the explosion. By adopting and enforcing ticketing and check-in procedures which remove the possibility of hold baggage travelling unaccompanied, these situations can be made less likely.

In addition to establishing such procedures, it is vital to ensure that they are complied with as intended, as the use of discretion by check-in agents can offer opportunities to terrorists of circumventing norms. It has been alleged that the Air India incident of June 1985 was allowed to take place because an argumentative passenger insisted on his luggage (which is thought to have contained a powerful bomb) being interlined from a CP Air flight from Vancouver to Toronto onto New Delhi via Montreal, while his ticket was confirmed only as far as Toronto. Faced with the customer's growing anger and the increasing length of the check-in queue, the agent elected to submit to his unreasonable demands, in the interests of facilitation, and wrongly relied on the good will of the passenger to declare that the operation had been permitted by Vancouver on his arrival at Toronto. In fact, the saboteur failed to board the aircraft at all.[45]

Following the Air India disaster, the aviation community started

[43] The current writer's description in *The Glasgow Herald*. Tuesday 11 January 1989, p. 9.

[44] Certain exceptions to this rule may safely be made, as where previously lost baggage is sent to its true destination on a later flight and where a "standby" passenger is refused access to an aircraft onto which accompanying baggage has been loaded.

[45] S. Jiwa, *The Death of Air India Flight 182* (London: W.H. Allen. 1986), pp. 78 - 86.

placing greater emphasis on baggage reconciliation,[46] that is, the pre-flight verification that passenger and baggage lists entirely correspond with each other.[47] Unsophisticated forms of passenger checks have been used in recent years, including a simple head count on board, prior to departure. Also employed are more detailed methods,[48] as where check-in agents append a unique identification number to each passenger's boarding pass, to be cross-referenced with a control sheet held at the boarding point. If carried out properly, this ensures that all passengers who have checked in for a particular flight are on board that aircraft prior to take-off. In the absence of one or more individuals at the boarding point, the correct procedure should be to remove from the aircraft any hold baggage which the passenger may have checked in, often necessitating all passengers and hold baggage being deplaned and matched physically. The technique can be refined by appending a number sticker to hold baggage so that in the absence of a passenger the bag may quickly be identified and withdrawn from its aircraft.

A difficulty presented by this form of reconciliation concerns the task of quickly locating the suspect item, which could be in any one of several hold compartments. Another problem is that while the simple reconciliation technique reveals if a passenger has failed to appear for a flight at the boarding point, it cannot readily disclose whether or not a hold item has been placed on board which was not intended for that departure. Although these factors are difficult to overcome, both can now be implemented by the use of simple computerised techniques, adapted for use in reconciliation processes. If boarding passes and hold baggage tags were to include a machine-readable section, a central computer in each airport would be able to coordinate records of the baggage and passenger flows. In addition to boarding passes being read in computer terminals at boarding points, baggage handlers would be expected to make a computer scan of the tags prior to loading them in a specific container. As well as providing boarding points with accurate, automatically accessed information concerning the presence of passengers and the precise location of their baggage in the hold areas, the computerised system should reject at the baggage handling stage any hold items which do not have an appropriate tag, specific to a ticketed passenger.

Unless different computerised baggage handling and reconciliation systems are made compatible with each other and are employed globally, a particular problem would be posed by the arrival from other airports of transfer baggage and passengers bound for ongoing departures. In such cases, a time-consuming reticketing of passengers and their baggage would be required for computerised reconciliation to be

[46] R. Wallis, *Beaumont Memorial Lecture*, Royal Aeronautical Society, Wednesday 18 October 1989.

[47] In 1985, ICAO revised its Annex 17 to include a new section, then known as section 5.1.4., which ultimately acquired the status of a "mandatory" standard. In October 1989, Annex 17 was revised, resulting in this standard becoming section 4.3.1. See Annex 17, fourth edition, October 1989.

[48] Jiwa (1986), p. 93.

effected. Eventually, the intervention of international agencies such as the International Air Transport Association (IATA) may provide for an integrated, technologically based system for major hub airports. The Association's Rodney Wallis, has remarked that standardising reconciliation procedures would be a cost-effective means of improving security and facilitation:

> "IATA estimates that mishandled baggage costs the airlines about $400 million a year; the same figure ICAO estimates for introducing a standardised worldwide system."[49]

Any reconciliation system rests for its success upon the correct procedures being followed prior to departure and, more importantly, upon the cooperation of carrier managers to ensure that tight schedules are disrupted and passengers delayed in order to make the time-consuming and irritating search of the aircraft for suspect hold items. Arik Arad, a former chief of security for El Al, has voiced concern that many western states and airlines place excessive emphasis on the technique, without ensuring that it is being implemented properly. Using it irresponsibly could be highly counter-productive to the interests of security.[50]

Indeed, a senior executive with responsibility for security and safety at a large international airline told the current writer that rather than follow reconciliation procedures to their logical conclusion, airline managers were often pressed by circumstances into honouring their timetables and permitting take-off, instead of recognising the threat being encountered.[51] This was confirmed by the writings of security expert, Yeffet:

> "If Lockerbie tells us anything, it is that airlines must match luggage to passengers. If, for any reason, a piece gets on an airplane without its owner, it should be taken off immediately, no matter what the delay or inconvenience to passengers. But airport managers, more worried about on-time statistics, routinely let planes fly with unaccompanied bags."[52]

In support of this statement, it is both useful and interesting to recall that in 1990 a Pan American internal company memorandum was revealed to have been written in the spring of 1988, indicating that the carrier decided, for reasons of speeding throughput rates from feeder flights, to ignore FAA regulations which prohibited the loading of unaccounted baggage. Instead of removing such articles, as would have been correct, the memorandum suggested that Pan American elected to gamble with the safety of their flights by merely searching such bags or screening them with X-ray equipment, which would be unable to

[49] *Jane's Airport Review*, February/March 1989, p. 40.

[50] *Condé Nast Traveler*, March 1989, p. 32.

[51] Interview with British airport security expert, Aberdeen, UK, March 1989.

[52] Yeffet and Barnes (1989), p. 132.

detect plastic explosives.[53] Such scant regard for security processes may have been a major contributory factor in the targeting of the airline later in 1988. It illustrates the dimensions of the problems being faced in trying to give security a higher priority than profit in the minds of managers and policy-makers. Only by issuing clearly worded regulatory norms and then by monitoring their absolute enforcement can aviation authorities such as the FAA be confident that the corporations involved in security are carrying out their activities as intended. Tolerating any needless and destructive abandonment of fundamental security principles does not serve the aviation community and its users well.

Nevertheless, it is correct to remember that no security technique can be foolproof in isolation. Assuming that hold baggage reconciliation processes are followed to the letter, no guarantee can be made on that basis alone that a flight is free from the threat of sabotage, for example, in the form of a hand baggage device. The destruction on 29 November 1987 of a Korean Air Boeing 707, for example, occurred because two terrorists planted a binary high explosive device (composed of two harmless liquids which become explosive only on mixing)[54] in an overhead baggage compartment in the aircraft's passenger cabin, then left the flight at Abu Dhabi before it departed for Bangkok.

Some airlines undertake hand baggage reconciliation in an effort to minimise risks of such attacks. Though less scientific than certain hold baggage verification techniques. the clearing of overhead compartments and floor space around passengers at each stopover point at least allows cabin staff to make a cursory inspection of more obvious concealment areas. Ideally, aircraft cabins should be given a full inspection on arrival at an airport, to determine whether or not devices have been placed in less noticeable places. Such an inspection might have prevented the attack on a TWA Boeing 727 on 2 April 1986, when a bomb was placed under a passenger seat.[55] Practically, however, such a proposal would be very difficult to put into operation because the present-day airliners are complex vehicles, with an almost infinite range of potential hiding places for small, but lethal devices. Security consultant Fred Dorey has estimated that a viable search of a Boeing 747 could take as long as ten hours[56] - an economically unacceptable length of time under current flying conditions.

One possible compromise on this rigorous standard which at least provides some guidance to cabin crews is to reconcile the number of passengers present on board before each departure with the number indicated on the manifest. As tickets of passengers terminating their flights at a stopover point are rarely inspected. it follows that a

[53] *The Independent*, Thursday 1 March 1990, p. 1.

[54] F.G. McGuire, "Explosive Detection Producing Explosive Controversy," *Airport Operations* 15 November/December 1989, p. 3.

[55] Vincent (1989), p. 9.

[56] BBC Radio 4, *Call Nick Ross*, Tuesday 19 April 1988.

terrorist ticketed for a more distant destination can probably leave the aircraft and clear customs and immigration, while the bomb remains on board, in the cabin or a hold. A simple head count would, of course, be grossly inferior to the international standardisation of ticket inspection at all immigration points, at which any terrorist attempting to deplane prematurely would be apprehended.[57] Both the extra delays and the international agreement required for such a system would make it an unlikely option in the short term, although it should be borne in mind for future reference in the event of emergency prevention tactics being required.

Another equally important limitation to the powers of reconciliation is the threat posed by suicidal saboteurs and innocent "dupe" carriers of bombs. In a situation where an individual is prepared to lose his own life,[58] or where for personal, financial or political reasons s/he can mislead an unwitting accomplice into taking an unidentified explosive device aboard an aircraft, verifying passenger manifests and matching passengers to their possessions must be insufficient. Such weaknesses, however, should not detract from the strengths of any security technique, because no single measure can be adequate to solve the security problems being faced by the industry. Only when combined into a systematic scheme of security activities can the individual component be made to operate effectively. For that reason, it is unfortunate that ECAC was prepared to promulgate a standard which sought to compromise the excellence which could be achieved through a policy of process integration between reconciliation and baggage screening:

> "When in special cases due to risk assessment or because of special circumstances at an airport, checked-in baggage is subjected to other security control measures which can prevent the introduction of weapons or articles likely to be utilised to commit an act of unlawful interference, a further reconciliation of boarding passengers with their checked-in baggage is not required."[59]

In addition to the procedures outlined above, which seek by means of arithmetical calculations simply to disclose information of dubious quality on possible inconsistencies arising from facilitation activities, some other means are required of determining positively whether or not a passenger is at least likely to be conveying an explosive device onto an aircraft.

4.4.2. Passenger Profiling

A very useful technique for reinforcing other security operations

[57] House of Commons Committee on Transport (1989), p. 7.

[58] See the case of Pacific Southwest Airlines Flight 1771, 7 December 1987, in which a former employee of the company which owned the airline involved committed suicide by causing an aircraft in flight to crash, killing 43 people on board. FAA statistics (listed in bibliography).

[59] ECAC (1988) paragraph 2.3.4.3.

which has been used by several airlines in recent years is known as "passenger profiling" and involves the observation and interrogation of passengers prior to boarding their aircraft of departure. Developed in the early 1970s by Dr E.W. Pickrel as a means of isolating certain key characteristics of persons most likely to hijack aircraft, it was soon adopted by the FAA to enable their security staff to select candidates for random screening (in the era before mandatory screening).[60] Observational and interviewing skills were employed by trained security staff, with such factors as ethnic origin, age, nationality, ticketing information and length of residency in the USA being coupled by the operative with the individual's degree of nervousness, response to questions and motivation for making the journey. Depending on security personnel members' analysis of the various interrelated factors involved. the passenger would either be refused access to the aircraft or would be subjected to a rigorous screening programme[61] and, if found to be unarmed, would normally be permitted to travel, though perhaps seated near to an unidentified sky marshal or in a position which allowed airline staff to monitor his activities during the course of the flight. By 1973 it had been determined that a profiling package tailored to the needs of individual airports could be expected to classify 99.5 per cent of passengers as a low risk, prior to their passing through metal detection processes. When combined with these and with interview processes and voluntary searches a very reliable form of security was achieved for low risk situations.[62]

This profiling method required no special training or skills from the security staff whose role was merely to identify possible hijackers. A major thrust of activity was directed towards stopping the escape of fugitives, the transportation of mentally unstable hijack "adventurers" and the return to Cuba of disenchanted Hispanic refugees, each of whom could often be identified by their nervousness or appearance. The job of selecting candidates for intensive security screening was, therefore, less difficult than in many airports facing a less specific threat from other forms of aviation offender. The easily identifiable form of threat being faced by airports along the eastern seaboard of the United States at that time allowed profiling to take the form of simple questions and observations aimed at finding hijackers whose principal objective was not political and so were unable to be classified within the parameters of terrorism. In 1972 Abramovsky described the early passenger profiling methods in the following terms:

> "Under the current program, certain airline personnel are in charge of screening out potential perpetrators. Selected airline employees are made privy to the contents of the "hijacker behavioral profile," which consists of a set of behavioral characteristics believed to be common to all potential hijackers. These characteristics, which were first compiled by a special task force instituted by the Federal Aviation Administration in

[60] W.A. Crenshaw (1987), pp. 85 - 86.

[61] Dawson (1986) II, p. 32.

[62] Dailey (1973), p. 1009 - 1011.

> 1969, are updated periodically as new information, concerning more recent hijackings, becomes available."[63]

These techniques were used to good effect by the FAA in the early 1980s in order to identify likely hijackers of US aircraft who would divert them to Cuba. Around that period airliners were successfully being hijacked by unarmed offenders who achieved their goal merely by using threats of violence or allegations that they were carrying bombs.[64] While security screening could not be used against such offenders, profiling techniques pinpointed which passengers were most likely to be potential hijackers. The original American approach to profiling was directed initially towards the specific problem of Cuban hijackings. The same basic principles of observation and interrogation can be and, in some cases, are applied to much more complex security scenarios, such as the identification of "dupes" (innocent carriers of saboteurs' devices),[65] with the necessary proviso that added complexity will always require an added time factor and more highly skilled operatives to carry out the techniques.[66] At its simplest, the questioning techniques must firmly attempt to establish the passenger's true identity, nationality and reasons for travel. It is then important to determine whether any passenger has allowed his or her baggage to be packed by another person, whether it has been unaccompanied at any stage since being packed and whether the passenger is completely aware of the bags' contents.

Passenger numbers frequently prevent detailed questioning from taking place, and so subsidiary profiling can be implemented prior to the actual questioning procedures, in order to select suspects for interrogation. The task of determining the types of passenger most likely to be carrying a bomb, either deliberately or unwittingly, can be made easier with the application of psychological factors in the profiling processes, which may provide evidence relating to a candidate's potential susceptibility to terrorist persuasion. Once key characteristics have been isolated so as to set prime suspects apart from other travellers, security staff can be trained to identify those passengers whose personal attributes and travel arrangements make them candidates for rigorous questioning and search procedures.

Although the range of factors considered in such detailed analyses is bound to change with developing circumstances[67] and is understandably protected from public scrutiny by the authorities which rely on it, considerations which may attract investigation are bound to include those which relate to personal identity and recent travel history.

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[63]Abramovsky (1972/73), p. 131.

[64]Vincent (1989), p. 31.

[65]House of Commons Committee on Transport (1989), p. 8.

[66]Vincent (1989), pp. 31 - 32.

[67]Note, however, that after the Pan Am flight 103 incident, the US FAA took seven months to introduce a profiling question on the carriage of electrical and electronic devices. President's Commission (1990), p. 30.

Hence, in addition to national and ethnic origins, it is vital to discern the age of the traveller and to know from where the individual has arrived, if s/he is a transfer passenger (that is a passenger using the airport as a point at which to change aircraft). Young, single women and impecunious men travelling alone from Middle Eastern states and destined for west European or north American states might be viewed, for different reasons, as being particularly easy dupe targets for terrorist groups. In the case of young women, there is a danger (albeit a very small one) of close friendships developing with a terrorist who asks as a favour for an apparently innocent bag or package to be taken to the woman's destination on his behalf. The Nezar Hindawi case illustrates ideally the difficulties to be met in such instances.[68] With poor male travellers, there is an equal risk of deals being made in which the traveller is paid and/or provided with a free ticket in return for transporting, for example, a suitcase which he is told contains drugs of abuse, money or other valuable commodities, but in fact holds an explosive device.

In terms of their capacity to reveal possible carriers of terrorist devices, these considerations are reasonable and practicable, although as unscientific and sexist assumptions they cannot be relied upon in order to identify all dupes - not least because of the large number of young men and women who would require to be given special scrutiny at airports. When combined with intelligence information or with additional profiling factors, however, these coarse criteria gain in sophistication and so in value. Nevertheless, they only become first class instruments of security when incorporated into a dedicated and integrated approach to offence prevention, drawing on intelligence information and combining with other screening operations.

While US carriers were developing and applying very simple tests of passenger identity and behaviour, Israeli systems were being framed for El Al which would be directed towards filtering out not merely hijackers but also potential saboteurs and innocent dupes. These uniquely detailed, labour-intensive and painstaking methods, discussed below, reflect the Israeli airline's inimitable stance on security, although other, less complex, anti-sabotage profiling techniques have been employed by other carriers. A key difference between the systems currently being implemented by most major carriers and those used by El Al is that with the former, questions are often asked in a cursory manner, or in some cases are simply displayed graphically for passengers to read while waiting in check-in queues, while with the latter, they are asked in order to extract vital information and to provide involuntary behavioural reactions from the passenger.[69] According to the El Al approach, the passengers' involuntary physiological response to questions must be viewed as being of at least equal importance to their voluntary, verbal answers.

[68] In this incident, which took place at London Heathrow airport on 17 April 1986, Hindawi attempted to destroy an El Al Boeing 747 aircraft in flight by persuading his pregnant girlfriend to carry a piece of baggage which, unbeknown to her, contained an improvised explosive device.

[69] *Condé Nast Traveler*, March 1989, p. 32.

The least sophisticated forms of profiling are those which are operated by check-in agents rather than by security staff. on account of the inability of properly trained personnel to analyse the nuances of "body language" required to make profiling fully meaningful in the surroundings of an airport vulnerable to terrorist infiltration. Additionally, it is misguided for airlines to allocate such functions to their facilitation teams, whose purpose it is to promote efficient and timely processing of travellers, when the very purpose of profiling techniques must always be to extract suspects from passenger flows after often detailed analysis of personality, behaviour and identity.[70] Alternatively, however, if profiling activities are made the responsibility of security - rather than facilitation - staff, it is vital that all baggage be made available for inspection at the point of questioning, which should be as early as is practicable in the facilitation process, in order that suspect passengers may be identified and withdrawn from the flow of travellers as soon and as inconspicuously as possible. More importantly, facilitation-related, ticketing information must be provided for the security team and used by it. An obvious misalignment between responsibility and capability exists wherever this weakness is to be found. The British experience of such difficulties is of interest in this respect:

> "The person checking in a passenger possesses two items of information which are of considerable help to staff trained in passenger profiling: the passport and the airline ticket. Airlines which rely heavily on passenger profiling are able to deduce from the nature of the ticket those passengers who may require further security checks at this stage. Check-in staff can and do select passengers for extra security screening. But it is regrettable that the airport security staff who routinely search passengers and their belongings have no information as to the passenger's nationality, origin or destination. BAA claim that their security staff are given "informal" training in body language. Such skills can be extremely effective, but only if combined with some basic knowledge about the passenger."[71]

This type of facilitation information could easily be provided to a check-in staff member for the purposes of facilitation and also independently to security personnel for assistance in profiling. Any justifications for the above-noted weakness must instead be based upon considerations of economy and convenience, because of the extra security staffing levels required and the additional process through which passengers would be forced to pass.

Wilkinson has noted that the world's use of passports is now ludicrously outdated, affording terrorists unnecessary opportunities to travel incognito. He has suggested that advances could be made in the use of travel passes without undue difficulty:

> "Over 90 per cent of aviation terrorism involves the use of false passports. Governments have done nothing about it. The world's airlines should go ahead and introduce a new high-technology

[70] Yeffet (1989), pp. 4 - 5.

[71] House of Commons Committee on Transport (1989), p. 5.

> identity document. A computerised air travel permit the size of a credit card could carry a fingerprint code which could be checked against the bearer, thus preventing the use of forged or stolen permits. The check would take only a matter of seconds for each passenger, and it would circumvent the outdated and unreliable passport document. ... Immigration and security officials could then devote more time to checking out those passengers from the few countries refusing to join the scheme - probably a small number of pro-terrorist states."[72]

Such an ambitious scheme could be expected to take several years to introduce internationally. In the interim, other methods of passport enhancement should be contemplated, such as that of "advance immigration", introduced in 1988 by the US Immigration and Naturalisation Service at Ireland's Shannon airport and suggested the following year for flights from the UK to the USA.[73] In essence, the proposed scheme involves an immigration check in the country of departure by officials of the country of arrival. A central feature of the system is the use of sophisticated computers containing intelligence information which could be cross-referenced against passports and other information being presented. As Robert J Aaronson of the (American) Air Transport Association remarked:

> "The mere fact that passengers, baggage and travel documents would have to run the gauntlet of clearance by seasoned government experts with immediate access to the entire U.S. intelligence community's look-out list would make a real contribution to this part of our war against terrorism."[74]

Although profiling can be a useful security component when carried out properly, it is often viewed by carriers as a requirement which can be satisfied without undue difficulty but which is both unnecessary and undesirable on most flights. For that reason, if any overt use of the method is employed, it is the cursory approach to profiling which is most normally to be found with airlines operating on low risk routes. Nevertheless, at least one carrier, El Al, bases its security philosophy in large measure on advanced passenger profiling techniques which are designed to detect potential threats in the form of persons, rather than in the form of objects of destruction, although it should be stressed that the procedure is carried out while passengers are still in possession of both hand and hold baggage, which is subjected to detailed screening.[75] Yeffet has even described its detailed questioning and observation of passengers as "the most effective way

[72] P. Wilkinson, *The Lessons of Lockerbie* (London: Research Institute for the Study of Conflict and Terrorism, 1989), p. 28; Clutterbuck (1990) II, pp. 140 - 141.

[73] *The Independent*, Tuesday 9 May 1989 (photocopy).

[74] *The International Herald Tribune*, Monday 8 May 1989 (photocopy).

[75] House of Commons Committee on Transport (1989), p. 8; *Condé Nast Traveler*, March 1989, p. 32.

to stop a terrorist."[76]

Rather than ask a fixed set of short questions which require one word, positive or negative responses, El Al's highly motivated security operatives are trained to promote more informative dialogue at greater length and to determine from the information received whether the respondent is being both truthful and sufficiently knowledgable about the matters in question.[77] Such a detailed and conversational approach to profiling is necessarily time-consuming and can be resented by passengers who find it unpleasant to undergo interrogation by uniformed officers. These factors may influence airlines' attitudes towards the technique and may result in their avoidance of the method or in reliance upon less scrupulous modes of questioning, as outlined above. In any case, El Al's peculiarly complex profiling activities and its unique position in the aviation community, discussed below, make it difficult to regard "all their methods as necessarily applicable to situations vastly different to their own."[78]

Instead, other means of reinforcement may be sought to strengthen the capacity of profiling techniques for utilisation in different situations. On the regulatory level, it is pointless to compel passengers to undergo questioning if they know that nothing prevents them from giving a false answer to avoid further questioning or search procedures. Were the provision of false information to security officers regarding the contents and packing of baggage to be made a criminal offence, as in the British Aviation and Maritime Security Act, 1990,[79] airports and carriers would be armed with a very powerful tool with which to punish any travellers who claim in response to a question that they know the exact identity of their bags' contents but who are then unable, for example, to describe accurately the contents of any wrapped object found inside.

Such a proposition, if publicised widely and if accompanied by proportionate fines and the possibility of ticket cancellation, would guarantee that greater care would be taken by travellers in packing and accompanying their baggage prior to a flight. As with all matters of security breach, only negligent and reckless passengers would need to fear such a rule, as travellers who had taken due care in packing and accompanying their baggage would be able to answer any question asked about it. In time, the public might assimilate such an offence type with customs declaration laws which are both accepted and respected by the majority of travellers.[80]

In the United States, a new FAA policy was established in 1989 by

[76] Yeffet (1989), p. 4.

[77] *Ibid.*, p. 8.

[78] House of Commons Transport Committee (1989), p. 8.

[79] Department of Transport Press Release, September 1990.

[80] See House of Commons Committee on Transport (1989), p. 9. for a similar suggestion concerning the regulation of couriers.

which civil fines of between $1,000 and $10,000 (US) could be imposed upon persons attempting to transport firearms through airport security points. This stringent approach, coupled with a greater use of additional prosecutions, replaced a previous policy in which lower fines or simple warnings could be applied to first time offenders.[81]

In the security regulations of certain countries, such as the United States, there exists a positive obligation upon carriers to communicate to passengers a series of simple profiling questions, asked verbally or conveyed through a printed medium. It is unfortunate that such a requirement should exist without being enforced adequately, as airlines are able to circumvent it with remarkable ease. It is simple to display signs asking passengers to ensure that hold baggage contains no potentially dangerous items, such as electrical objects. It is far more difficult to enforce such an exhortation without imposing time-consuming and universally unpopular searches.

More worrying even than such cases of unenforced recommendations to passengers is the deliberate use of pointless and void techniques. With one airline flying to the United States from the Federal Republic of Germany, badly paid - and so badly qualified - profiling staff were recruited who could speak only German. As many passengers were US citizens who spoke only English, a means of asking the questions in their native language required to be found and was identified in the practical - if entirely inappropriate - means of teaching the German personnel questions in a language which they could not understand, without any expectation on the part of the airline that they would be capable of responding in an informed way to the answers which they received.[82]

This instance of managerial failure to provide adequate solutions to security problems highlights two related difficulties which will be referred to at later stages of this thesis: first, the problem of unenforced regulations being made by authorities in order to indicate that action is being taken by an organ of state, rather than with any intention of making effective improvements in security; and second, the issue of carriers taking inadequate levels of action on the basis of the promulgated rules so as merely to satisfy the requirement made of them and thus evade accusations of inactivity.

On a more practical level, the example detailed above of linguistic difficulties to be faced by security staff illustrates the problems of communication with passengers which will become more complex as international routes diversify, liberalisation of travel restrictions comes into effect and a larger range of uncommon languages (particularly eastern European ones) become more prevalent within the travelling public. One compromise which would constitute an incomplete solution to these complexities, would be for a book containing security questions which have been translated into all major languages to be made available at all security check points.

[81] *Jane's Airport Review*, June/July 1989, p. 9.

[82] Interview with Richard Myers, Glasgow, UK, Saturday 25 November, 1989. Channel 4 *Dispatches*, 20 December 1989.

The questions could be simple, concerning the contents of baggage, and requiring only positive and negative answers to be made by pointing to an appropriate column on the question sheet, for the benefit of observing security personnel. Although this suggestion would not permit any detailed approach to profiling to be made, it would at least raise levels of understanding to a more tolerable state and would be more practical than hiring multi-lingual staff members with a collective working knowledge of the world's languages.

Such limitations of complex profiling provide that it must always be difficult for carriers to operate the technique effectively in the context of an expanding, diversifying and fast-moving aviation community, while its detailed nature makes it much more appropriate for the special circumstances of high risk operations. If its strengths could better be accommodated into a demanding and testing marketplace environment, progress might be made in preventing and deterring aviation violence.

Nevertheless, as with baggage reconciliation, even the best passenger profiling systems suffer from considerable operational limitations, making it another incomplete form of security in which it would be foolish to place complete trust. Any passenger of any age, gender, background and identity can be made to become a dupe. Determining, for example, whether or not travellers packed their own baggage, accompanied it at all times, were aware of the full contents of it and could identify those contents, would assist in the overall security process but would be inadequate to provide anything like a full guarantee of innocence. It would be quite possible for a terrorist to disguise a bomb as an article commonly carried by travellers or to secrete a device in the most ordinary of objects, such as a suitcase and then, for instance, to exchange it for that of the dupe, while it lies unattended in a hotel room.

More disturbing than this is the problem of being unable to apply profiling techniques to the best trained and equipped of terrorists, notwithstanding Yeffet's comments (noted above) on the special utility of profiling for identifying terrorist suspects. The sabotage on 29 November 1987 of a Korean Airlines Boeing 707 with 115 persons on board was carried out by two North Korean intelligence agents, holding realistic, though forged, Japanese passports which identified them as Shinichi Hachiya, a 69 year old man, and his daughter of 23 years, Mayumi. The quality of their spoken Japanese was excellent and nothing suggested that they were anything other than innocent, private passengers of benign nationality, seeking to fly from Baghdad to Seoul via Abu Dhabi. As well as these considerations, it appears that the agents were highly disciplined, having been systematically educated in bomb production, deception techniques and Japanese culture. The couple, Kim Sung-Il and Kim Hyon-Hui, had been coached together for over three years as a sabotage team with the younger member later confessing to South Korean officials that she had been recruited in and trained from 1980.[83] After such intensive preparation, the agents were well prepared, not simply to place their bomb on board the flight prior to disembarking at Abu Dhabi, but also to evade all security checks at Baghdad and to promote their false nationality and

[83] *Arab News*, Saturday 16 January 1988 (photocopy).

father/daughter relationship convincingly so as to nullify profiling techniques which might have been used against them at Baghdad's high security airport.

The conclusion to be drawn from this incident, and from similar cases in which hijackers and saboteurs have successfully disguised their identities and their nervousness, is that the valuable and necessary tool represented by passenger profiling cannot be trusted to defeat terrorists who have been trained comprehensively in the art of personation.[84] Indeed, neither the industry nor governments can afford to regard any technique or process as being a watertight repellent to terrorists' threats, because of the evolutionary nature of offensive capacities and the demonstrable defensive weaknesses which continue to threaten the integrity of aviation.

4.4.3. Access Control

The imposition of security posts for the screening of passengers and their baggage at airports constitutes, of itself, a type of access control. Efficient screening points act both as filters for arms and explosives and as valves for the prevention of passenger regression from security-sensitive zones. In this way they can become important mechanisms for establishing a vital and reliable landside/airside boundary in terminals and are literally in the "front line" of security activities. In addition to formal screening points, however, it is necessary to deploy other means of access control at airports. The purpose of this is simply to provide a ring of uninterrupted protection for sensitive areas - most notably the airside region where aircraft are situated.

It is pointless to impose labour-intensive, expensive, high security screening barriers within passenger terminals if no reasonable degree of protection is accorded to servicing bases, cargo, courier and mail terminals, vehicle entry points and other sectors within easy reach of vulnerable targets. On several occasions, offenders have demonstrated the ease with which they can find points of entry into airports for placing persons, weapons and explosive devices on board aircraft. The experiences of the TWA hijacking of June 1985, in which arms were smuggled onto the aircraft via servicing crews, and the Pan Am attempted seizure of September 1986 in Karachi, Pakistan, where terrorists gained entry to their target after posing as security guards in an apparently official vehicle, both demonstrate the need to maintain vigilance throughout airports' access points at all times.

Of course, busy airports require complex series of corridors, carriageways, doors and gates to be included in airport designs, linking the outside world to sensitive areas and facilitating the work of the thousands of employees with access to the airside. This does not imply, however, that any lowering of security levels should be tolerated. Instead, as ECAC's security manual describes:

> "Boundaries should be established between landside and airside

[84] For a very useful analysis of the strengths and weaknesses of passenger profiling techniques see L. Zoucker and M. Bachrach in Lewis and Kaplan (1990), pp. 165 - 175.

areas. Passages through such boundaries should be protected by guarded gates and/or locked or guarded doors which should be inspected at irregular intervals."[85]

Only when airports are regarded as centres of vulnerability which require constantly high standards of security by those who manage and operate them can they acquire their true status - akin to that of military establishments or prisons. The practical problem for authorities is that airports are, by definition, public places, involving a much higher turnover of transitory persons and vehicles than forces bases or penitentiaries. Hence, it is necessary for a certain ease of public access to permissible areas of airports to co-exist with a policy of rigorous access control wherever required. Defining the limitations of public access can be difficult at some high security venues, as will be demonstrated below. Common to all airports, however, is a need for high quality perimeter control measures.

4.4.3.1. Perimeter Control

Although it should be evident to airport managers that peripheral access control is of equal importance to any other form of boundary protection, it is not uncommon to hear reports from those within the industry of badly maintained or non-existent fencing at the edge of some airports, particularly those with perimeters several miles long. Gaps in fencing or inadequately erected systems allow would-be intruders to pass undetected and unimpeded from landside to airside, literally, in one easy step. It should be a key priority of airport designers to include in their plans - particularly for major sites - adequate perimeter protection, perhaps even of the kind so often found at military establishments. Anything less than this fails to take account of the importance of aviation protection.[86]

Fencing should be constructed of strong and dense material, such as close chain link, to prevent easy destruction. In order that it can be monitored at night with infrared night-sights, the chain link should be coated with durable white PVC - an innovation introduced by Dorey into at least one high security airport, allowing immediate determination of infiltration locations at night.[87] Adequate vertical coverage of the fence, both above and below ground level should be accompanied by the employment of copious quantities of coiled razor wire or barbed wire, as a visible indication of security protection, and by the use of robust concrete post foundations to prevent fencing being uprooted.

In addition to these structural considerations, excellent reinforcement can be achieved by incorporating a second barrier of fencing within the first, a monitoring carriageway for vehicular

[85]ECAC (1988), paragraph 2.2.1.

[86]For an interesting description of poor airport perimeter protection and its consequences see Clutterbuck (1987), p. 76.

[87]F.C. Dorey, Untitled conference paper presented at "Scotsec '87" conference, Renfrew, UK, 11 November 1987.

security patrols separating the two. These features would not only act as a first class deterrent to anyone anticipating a quick entry, but would provide a second physical barrier to breach, should the first be crossed. The incorporation of warning signs, sirens and flood lighting also enhances security and increases deterrent qualities.

Modern security fencing systems need not be passive forms of protection. By using electronic perimeter control systems, taut wire fencing can be monitored by staff and/or computer from a central command and control location. The placement of electro-mechanical intrusion detector sensors along a fence can provide a warning in the event of attempts to cut, spread or scale it, allowing swift response from staff informed of the precise location of the breach. Additionally, CCTV cameras can be set to start recording any form of activity in locations which should be deserted, such as the "no man's land" sector between fencing layers. False alarms could, in theory, be caused by animal or climatic interference, although sensitivity can be altered with ease to filter out virtually all but genuine breach attempts.

It need hardly be remarked that security fencing systems such as those described in the foregoing paragraphs can cost a very great deal to install, monitor and patrol, at least when compared with the simplest types of fencing. It must be for airport authorities to determine which of their sites require the more complex forms of boundary, although it should be clear that any prominent airport covering a large geographical area can be at risk from the dangers of unnoticed penetration.

4.4.3.2. Entry Point Security

At points of high vulnerability, such as entrances to airside regions, it is necessary to utilise security points which complement perimeter boundary controls and passenger screening points, so maintaining a unified protective shield around sensitive areas. As an absolute minimum form of deterrence, all such points of entry should be protected, by being locked fast when not in use and otherwise manned by security guards who can monitor the flow of persons, vehicles and other objects, and carry out occasional security spot checks.

A major difficulty in securing all entry points is encountered at the largest international airports which feature a multitude of landside/airside crossing points. Even after unnecessary access points have been closed or blocked in the interests of security, there must still be a large number of vulnerable areas left to secure, such as servicing entry points, cargo cross-over sectors and aircraft crew entrances. In these and similar circumstances, it is vital to ensure that only those persons entitled to gain access can do so.

Such simple apparatus as unidirectional full-height turnstiles can ensure the existence of a one way system, making it difficult for an unauthorised person to make a brief visit to the airside. When combined with an electronic card reader or personal identification number decoder, security is increased slightly because of the need for users to possess a personalised pass or code number. Absolute security cannot be guaranteed using such systems because nothing prevents an unauthorised intruder from coercing a card or number

holder into giving over the unique, but not user-specific, pass or number. The use of photographs on passes does little to improve security when used alone, as reports of bored security personnel failing to verify the validity of the tiny images are legion. One successful security evader told the current writer that he gained access to a very sensitive British passenger aircraft by showing his charge card (without a photograph) to a guard.[88]

A variety of technologically advanced, automated access control systems have been developed to enhance basic access control features.[89] For example, the West German firm Gallenschutz Metallbau GmbH has combined into its turnstile systems mechanisms for automatically verifying entrants' identities and for ensuring that only one person per security pass can enter or exit a secure zone. "Anti-passback" protection can be incorporated to prevent one pass being used to permit two consecutive movements in the same direction through one access point.[90] It is also possible to differentiate between high and low security passes by making it possible only for holders of certain passes to gain access to the most secure zones and by using an alarm method to alert security personnel of any attempt to gain unauthorised access.[91] When linked to a computer database, accurate records can be kept of individuals' movements around an airport.

For the most sensitive areas of airports, enclosed cylindrical doors can be used. To enter the system a form of identification must be presented. If accepted by the system, the pass will open the first door, permitting entry to the cylinder, then close, momentarily trapping the person. At this point, confirmatory checks can be made to determine that the pass holder is entitled to transfer into the secure zone. This can be done in the form of a personal code number, a weight sensor (which also guards against more than one person being in the cylinder) or a finger-print reader or similar device, to isolate a unique characteristic of the person being checked. Once the system is satisfied that the person is entitled to enter the zone, the second, forward door is activated, allowing the transfer to be completed.

For computer controlled access systems to be of use in the largest airports, it will be vital to maximise the speed with which a computerised system can identify a person from the pass signal being presented. In particular, weight confirmation can take several seconds. Gallenschutz has remarked that his firm's devices allow a bidirectional throughput rate of between twenty and twenty-five

[88] Informal interview with British intelligence consultant, Geneva, Switzerland, February 1987.

[89] For an excellent assessment of modern access control systems, see *Airports International*, January 1990, pp. 22 - 27.

[90] T. Gallenschutz, "Access Security within Terminal Buildings," *Airport Technology International* (1988), p. 243.

[91] J.R. Norville, "Airports - Protecting the Airside," *Airport Technology International* (1988), p. 247.

persons per minute - a rate which would be more impressive but for the inefficiency of the card reader employed.[92]

Of course, the practical difficulties involved in curbing unauthorised access to vulnerable airport locations must be noted when assessing the theoretical benefits of control systems. Furthermore, the large number of firms with commercial reasons for entering airports or for making consignment deliveries must also be considered. Catering, maintenance, hygiene, cargo and other services all involve the transfer of goods and persons from the landside to the airside. One aspect of this problem which must be considered by airport managers is the particular inadequacy of trusting that airside staff at an airport are sufficiently reliable and honest as to require no on-site security inspections or monitoring. In any low paid, high turnover work role, including many servicing jobs, it should be remembered that bribery, blackmail and terrorist infiltration can each result in workers being tempted, forced or else choosing to carry firearms, explosives and related objects on board aircraft being serviced on the airside. In 1989, GUnter Eser, Secretary General of IATA, alluded to the scope of this problem for the biggest international airports when he noted that Frankfurt Main licenses approximately 30,000 workers with airside passes, while London Heathrow and Gatwick each issues about 50,000 airside ID cards.[93]

The great difficulties involved in vetting large numbers of workers were highlighted in the months after the Lockerbie bombing, when several journalists in separate incidents gained access to vulnerable airside zones simply by taking up cleaners posts which offered immediate entry to wide-bodied jets.[94] No check was made of their falsified application details and no landside probation period was imposed on them. As a response to this inadequacy, the British Secretary of State for Transport, Paul Channon, imposed certain regulations on servicing firms, requiring the verification of applicants' particulars, the taking up of references and a six month probation period before work on the airside could be allowed. More notably, in early April 1989, he ordered the introduction, within a year, of reliable access control systems at a total of nineteen British airports.[95] These systems would be computerised to facilitate the automatic reading of staff passes for entry to restricted zones, with passes being issued sparingly. In addition, it was announced that restricted areas would be patrolled and aircraft would be searched prior to flights and then protected from unauthorised

[92] Gallenschutz (1988), p. 243.

[93] *The International Herald Tribune*, Monday 15 May 1989, p. 2.

[94] G. Norris, "Security Concerns Across the Atlantic," *Interavia Aerospace Review* 7 (1989), p. 693.

[95] Aberdeen, Belfast Harbour (Sydenham), Belfast International (Aldergrove), Birmingham, Bristol, Cardiff/Wales, East Midlands, Edinburgh, Glasgow, Leeds-Bradford, Londonderry (Eglinton), London (Heathrow), London (Gatwick), Luton, Manchester, Newcastle, Norwich, Prestwick and Stansted.

access.[96] Most importantly, the new regulation made clear that entry to restricted areas by any authorised staff would be subject to a standard of search equal to that imposed on passengers.[97]

In the United States, regulation of computerised access control measures was made by an FAA final rule of 8 February 1989,[98] which applied to all airports used by aircraft with more than 60 seats.[99] This was imposed in spite of doubts concerning calculations of expense, the estimated provision requirements of terminals and the state of advancement of the technology involved.[100] In particular, Tom Browne of the Airport Operators' Council International (AOCI) voiced the following concern:

> "There are a lot more doors and access points on airports than the FAA have estimated. They've calculated between 10 and 130 at any given airport - we have recently conducted a survey which found this figure to be between 30 and 500."[101]

Another major difficulty which must be addressed in relation to access control concerns the need for standardisation of systems from one airport to another. In the absence of such coordination, multiple passes would be required by crew travelling from site to site, presenting the possibility of passes being lost or stolen and of the inefficient systems causing congestion problems for staff.[102]

In situations in which tens of thousands of personnel have access to an airport's sensitive areas, the best form of offence prevention mechanism will be to screen as many staff as possible (ideally all) as they pass from the landside onto the ramp and to monitor their work. If one hundred per cent screening is unfeasible, reliable access control systems should be set in place to permit entry only to legitimate workers with valid passes, who should be made subject to the possibility of random security searching at access control points and at their work places by roving security teams.

4.5. The Role of Airport Security Personnel

The significance of the human element in the operation of airport

[96] *Flight International*, 6 May 1989, p. 12.

[97] Norris (1989), p. 693.

[98] 14CFR Part 107.

[99] D. Nelms. "USA Plans Tighter Security." *Interavia Aerospace Review* 7 (1989), p. 690.

[100] Wallis, Beaumont Memorial Lecture (1989); *Jane's Airport Review*. February/March 1989. p. 2; *Airports International*. January 1990. p. 25.

[101] *Jane's Airport Review 1989*, February/March 1989, p. 2.

[102] Nelms (1989), p. 691.

security should not be underrated.[103] Although writers on the subject of airport security may differ in their attitudes towards the changing role of security personnel in an age of high technology, all seem to be agreed that the strength of screening and access control equipment is utterly dependent upon the utilisation of it by skilled, rational staff. In discussing this very important topic, four categories of interest are able to be recognised as being of particular concern: staff recruitment; training; operations; and employment conditions.

4.5.1. Staff Recruitment

In 1986, the British House of Commons Transport Select Committee recommended that action should be taken to permit security employers to question job applicants about certain criminal convictions. It noted that domestic legislation should be amended to permit applications to be vetted outwith the complex restrictions of the Rehabilitation of Offenders Act, 1924, and related laws.[104] This legislation creates a legal fiction, recognising that for most types of employment it should not be necessary for a job applicant to admit the existence of a limited criminal record after the passage of a certain period of time. In essence, the law can permit the deliberate promulgation of a lie (that is, that a criminal record does not exist) and can restrict the legal ability of a prospective employer to determine the truth (that is, that a criminal record exists). Media law experts Robertson and Nicol have described the application of the Act in the following terms:

> "The Act applies only to convictions which have resulted in a sentence of no more than thirty months' imprisonment, and which have been 'spent' - ie a certain period of time has elapsed since the passing of sentence. The length of that period depends on the seriousness of the punishment: where there has been any period of imprisonment between six months and thirty months, the conviction becomes 'spent' after ten years have elapsed. Seven years is the rehabilitation period for prison sentences of six months or under; five years for all other sentences which fall short of imprisonment, save for an absolute discharge which is 'spent' ... after a bare six months."[105]

Hence, only ten years after a person had been sentenced to two-and-a-half years imprisonment for a serious offence, s/he would be able to apply for a security job at a British airport with no duty to reveal the existence of the conviction and the severity of the punishment imposed. Despite the Committee's suggestion that aviation security activities should be exempted from the Act, the British Government refused to issue an Exceptions Order for the industry, claiming that little of benefit would be expected to be gained by such a course of

[103]Brenchley (1986), p. 2.

[104]House of Commons Committee on Transport (1989), p. 10.

[105]G. Robertson and A.G.L. Nicol, *Media Law* (London: Sage, 1985) p. 47.

action.[106]

It is clear that major difficulties exist in vetting applicants for airport security posts if full knowledge of their previous activities cannot be gained. This fact alone should cause authorities to formulate procedures for screening prospective employees' applications, such that it is impossible for any individual convicted of a serious offence (determined by, for example, the existence of any form of prison sentence) to be employed in the field of airport security.

On a more positive note, staff who are employed should be intelligent and able to communicate well with members of the public. It would be beneficial to the industry for minimum educational qualifications to be established as a threshhold level for entry to security posts, to attempt to ensure a degree of ability in the workforce. This would, of course, require to be accompanied by improvements in pay and conditions to encourage able workers to apply for security vacancies.

4.5.2. Training

Security training is a subject of relevance to all personnel engaged in aviation-related activities and must be included as a key element of training for managerial and general staff, as well as for those who are engaged in security as their principal form of work.[107] In formulating an appropriate syllabus for each type of employee, reference must be made to security priorities of each. As a general guide, Dorey has proposed sixteen subject headings for which material could be prepared: history of aviation security; international control of civil aviation - security aspects; airport services' view of security; role of law enforcement officers; terrorist organisations; recognition of explosive and incendiary devices; airline security; perimeter protection; terminal buildings; identification of people; identification of vehicles and mobile equipment; security surveying; bomb search; report writing; law subjects; and duties of the security guard.[108]

Organisations such as IATA and IFAPA have drawn attention to the broad national and international variations found in levels of security training.[109] For many states, no systematic approach is taken towards the subject, with staff education being given a very low priority. In the UK - supposedly an advanced aviation power with a key interest in promoting security - the official security training situation was reported as follows in 1986 by the House of Commons Transport Select Committee:

[106]British Government (1986), pp. 8 - 9.

[107]See N. Freeman, "Aviation Security Training is a Necessity." *ICAO Bulletin* 34 (November 1979), p. 33.

[108]Dorey (1983), pp. 244 - 246.

[109]Information drawn from communications with Rodney Wallis and Geoffrey Lipman.

> "The Department of Transport training course for ordinary security staff (ie those who undertake passenger/baggage search, access control duties, aircraft guarding etc) lasts five days. The course objective is defined thus: "On completion of training, participants will be able to perform security duties". Perhaps "defined" is the wrong word. This training does not compare well with that given to fire and other emergency services.
>
> Training for employees of private security firms appears to be virtually non-existent."[110]

The gross inadequacy of many states' training programmes for screening staff was summed up by Vincent in his comparison of US and Israeli rules on the matter:

> "Perhaps the most glaring deficiency in the current U.S. civil aviation security system is the lack of required security training. Only the security training for flight crews and the Ground Security Coordinator's position is required to have specific hours of security training. Others involved in the security system, e.g. X-ray screeners, etc., are not required to have any specific amounts of training to perform a security function. Subject matter is also loosely defined, so loosely as to be totally ineffective.
>
> By contrast, the Israeli security system invests four to five weeks in each individual involved in the application of their security system before allowing the individual to apply their security measures. ... Two U.S. air carriers operating in Europe, and now a third following the Pan Am 103 tragedy, have implemented portions of the Israeli security system. Regrettably, these airlines still only provide approximately eight to ten days of initial security training."[111]

Yeffet has been more scathing about US attitudes towards security training:

> "The level of training given by American air carriers to their security agents is extremely low, insufficient and not effective. The training period is too short--just eight to ten hours for each security agent. That training usually consists of teaching an agent what a revolver, hand grenade, dynamite and pipe bomb look like on a x-ray machine and how to operate the machine."[112]

It should be obvious to the industry, as well as to the authorities which regulate it, that the detailed specification and enforcement of security training courses is now required for the purposes of improving basic abilities and guaranteeing some degree of efficiency

[110]House of Commons Committee on Transport (1986), p. 10.

[111]Vincent (1989), p. 30.

[112]Yeffet (1989), p. 1.

within the industry.[113] This subject will be considered in relation to international coordination of security improvements (see below).

4.5.3. Operations

The role of airport security operatives can be boring, repetitive and lacking in promotion prospects. Perhaps it is partly for this reason that the quality of staff employed is often very low. Yeffet described as "shocking" the extent to which US security staff questioned by him at ten American airports in 1989 gave no consideration to their jobs' enormous public importance.[114] Such an observation bears no comparison with the true needs of the industry because there should always be strong demand for well-motivated, alert and resourceful staff.

This dichotomy between the actual and the ideal is made even more significant by the fact that security staff are not simply the ultimate safety net for the industry, but are also often the only point of contact between law-related authorities and aviation offenders. Vincent has estimated that as many as fourteen incidents of aviation sabotage or attempts at it have taken place since 1982 without advance warning being made and without security and intelligence agencies being aware of the existence of a specific threat.[115] In such cases, the industry must pin its hopes of interception on security workers, many of whom seem to regard their work as being little more than a mindless sinecure.

Responsibility for this dangerous state must, in large measure, rest with those airports and carriers which offer badly paid, boring and directionless security posts. It is not impossible to create imaginative, advanced security roles for skilled and semi-skilled labour, involving activity variation, periodic retraining schemes and a structure for self-improvement and employment promotion, but these posts require greater managerial initiative and activity plus more resources than are presently invested by many carriers and airports. Greater use of financial incentive to reward the most alert security team members might assist efforts to motivate staff to higher performance levels. Motivation can also be encouraged on the highest risk routes by requiring security staff to fly on board the flights which they have serviced - another high cost but very effective option.

One reason for security posts being perceived as boring by personnel may be the lack of excitement and challenge in many aspects of the work. In most airports around the world, security employees might expect to work for a period of years without being faced with a hijacking, sabotage or airport attack attempt. Only very rarely will staff have to cope with serious incidents of security breach

[113] Note that on 26 July 1989, US carriers introduced the industry's first employment and training standards for screening personnel. McGuire (1989), p. 6.

[114] Yeffet (1989), p. 2.

[115] Vincent (1989), p. 29.

occasioned, for example, by attempted infiltration of knives, replica guns or fake explosive devices. For the majority of operatives' working lives the most serious security lapses routinely encountered will most likely be those involving unaccompanied and unreconciled baggage, innocent access control breaches and other incidents which might be classified as honest mistakes.

Despite the low statistical chance of an airport witnessing a serious attempt at violent air crime, it should never be assumed that any site can be free from risk. Because of this, security personnel should be monitored periodically by management in the conduct of their duties and tested with terrorist infiltration simulations on a regular basis. In addition, the use of staff testing and attractive reward schemes can help to promote workplace satisfaction and improvements in results.[116] In these ways, staff can be kept alert in their day-to-day work and be ready to cope with a real crisis, should it arise. It is not surprising that El Al operatives are regularly tested by staff members posing as terrorists, carrying fake devices.[117] This example should be followed by more carriers and airport authorities.

4.5.4. Employment Conditions

Because security screening is so often regarded as an expensive and inconvenient encumbrance for airports and carriers, the pay and employment conditions of security staff are frequently poor, discouraging job applicants of high quality from applying for the work. Also, the terms of employment are frequently laid out in short term contracts, further detracting from job security.[118] In the USA, where most security staff are employed by sub-contracted agencies, it is not uncommon for hourly rates to be very low - $3.60 (US) per hour was one example presented in 1989 for a security guard in Stapleton airport, Denver, Colorado.[119] Promotion schemes can also be far from inviting. At O'Hare airport, Chicago, an employee of a sub-contracted security firm stated in 1989 that she earned $3.35 (US) per hour and would receive only a 10 cent per hour pay rise after her first year of service.[120] If staff are hired at a low wage, not only will a poor quality team of security personnel be recruited, but also staff will constantly be looking for better employment elsewhere. Furthermore, there must even be a higher risk of bribes from prospective offenders being accepted by less scrupulous staff, keen to earn extra money. In addition to reasonable pay levels being offered to security workers, reward schemes should be employed to encourage staff to provide airport managers with information which might lead to arrests and to promote loyalty from personnel.[121]

[116] *Jane's Airport Review*, February/March 1989, p. 40.

[117] House of Commons Committee on Transport (1989), p. 1.

[118] House of Commons Committee on Transport (1986), p. 16.

[119] Yeffet and Barnes (1989), p. 133.

[120] *Condé Nast Traveler*, March 1989, p. 33.

[121] H. Degeneste in Lewis and Kaplan (eds.) (1990), p. 57.

At one independent British airport which the current writer toured in 1989, the security director remarked that efficiency was promoted by offering a very attractive pay scale for security staff, encouraging keen young people to apply for available posts. It was not uncommon for the team to employ persons who had narrowly failed Police entry examinations. These candidates displayed a genuine interest in law enforcement and often held good educational qualifications. The security team was viewed with respect by other groups within the airport because it comprised intelligent, well-disciplined and able people who understood the importance of their work and who were courteous but firm in the execution of their screening duties.

At the managerial level, it was recognised that variety in security work dispelled boredom and promoted continuity of service from the staff as a whole. For this reason, team members were trained to carry out a broad variety of roles. It was also made known to security personnel that their good pay and conditions brought with them genuine responsibilities. If, for example, an act of negligence resulted in a security lapse occurring, the accepted practice was to issue a formal, written warning to the staff member(s) involved, intimating that a further error within the subsequent six month period would result in certain dismissal.

Such a reasonable combination of incentive and threat resulted in a dedicated and industrious team being formed which had proved efficient in filtering conventional objects of air crime from the airport environment. If human effort is viewed as a key resource in the security industry and appropriate investment is made in the training and running of high quality teams, real progress can be made in security enhancement.[122]

4.6. Conclusion

The short history of airport security reveals that the practices and procedures most commonly undertaken can never be sufficient to prevent and deter all types of violent air crime. As useful components, conventional search systems, baggage reconciliation, passenger profiling, access control and manpower each play a vital role, yet more is required to expand the competences of security teams at airports. As shall be seen in the following Chapter, the employment of current screening techniques cannot hope to present even a moderate challenge to advanced terrorists of the future. Moreover, it will be established that technological capacities of most airports' security apparatus of the early 1990s cannot be trusted and must be superseded with more suitable systems.

[122] *International Security Review*, January/February 1990, p. 8.

CHAPTER 5

NEW THREATS FROM VIOLENT AIR CRIMINALS

> "The past regime has exported a thousand tons to Libya and yet two hundred grammes of Semtex is enough to blow up an aircraft. This means that world terrorism has supplies of Semtex to last one hundred and fifty years. The present democratic regime in Czechoslovakia is unable to make Libya return the Semtex."[1]

> "The number of things that a terrorist can do is far greater than can ever be defended against."[2]

5.1. Introduction: Terrorists' Weaponry and Devices

Weaponry and devices of destruction which have been used by terrorists to attack aviation targets require to be distinguished from those commonly used by aviation offenders with no political motivation. In "common" crimes of aircraft diversion undertaken by refugees, mentally unstable offenders, fugitives and transportational hijackers it is typically weapons which are freely available which are used, such as commercially marketed firearms, hunting and combat knives and sharp domestic objects. For potential hijackers who do not wish to be detected by conventional screening methods, the use of or threat from liquid hydrocarbons, such as petroleum and butane have proved sufficient to facilitate a desired rerouting. More ingenious improvisation has resulted in spirit alcohol and broken bottles being transformed into objects for intimidation, adding a security argument to the commercial and safety justifications for restricting pre-flight duty free franchises.

With terrorists' politically motivated activities, scrupulous preparation, the need for maximum effectiveness and the benefits of state-sponsorship can combine to ensure that weaponry and armaments are of a more sophisticated and efficient nature. Although Clutterbuck has rightly drawn attention to terrorists' use of improvised explosive devices and a wide range of firing mechanisms, the most serious incidents of aviation violence often involve sophisticated weaponry.[3]

[1] Czech President Vaclav Havel, speaking in London, 22 March 1990. BBC Radio 1, *Newsbeat*, Thursday 22 March 1990.

[2] P. Robinson, former associate director of national security at the US National Laboratory, Los Alamos. *Discover* June 1986, p. 24.

[3] Clutterbuck (1990) I, pp. 53 - 54.

In complex acts of hijacking it is important for terrorists to have confidence in the devices which will be used and so it is not uncommon for military firearms, grenades and high explosives to be infiltrated on board an aircraft, either through passenger screening points, if able to be concealed, or via the ramp, possibly with airport staff cooperation. Evidence given in a German court by Hamadi in his 1988 trial revealed that prior to the inception of the TWA incident of 1985, weapons had been placed on board the aircraft to await the arrival of the hijacking team.[4] In this way, the employment of advanced technology to detect metal was rendered redundant, allowing the traditional weaponry, which screening was supposed to prevent reaching aircraft, to evade all controls. This demonstrates the importance of adopting a comprehensive overview of security defences. because terrorists have shown on several occasions (detailed throughout this thesis) that they are prepared to seek out weak points in airports' security methods rather than risk ruining their carefully planned schemes by providing authorities with any needless opportunity to apprehend them.

There can be no doubt that the combination of existing technology and ramp security processes have failed to prevent metallic weaponry and explosive devices from reaching target aircraft and allowing hijacking and sabotage attacks to take place. Additional to this consideration is the development of non-metallic devices such as plastic firearms and explosives (both considered below) which are very difficult to detect with most security apparatus currently in operation.

5.1.1. High Explosives

The essential fragility of civil aircraft has always proved a vulnerability to ruthless saboteurs who realise that a very small amount of explosives can be necessary to destroy and kill.[5] In particular, the ease of availability and use of some high explosives (also known as detonating and secondary explosives) in sabotage devices has facilitated the tasks by providing a very potent, yet

[4]Wallis, Beaumont Memorial Lecture (1989).

[5]For a description of explosives' characteristics see T.G. Brodie, *Bombs and Bombings - A Handbook to Detection, Disposal and Investigation for Police and Fire Departments* (Springfield: Thomas, 1972), pp. 30 - 42.

compact and frequently concealable anti-aircraft bomb.[6] Combined with sophisticated activating systems, such as non-metallic fuses,[7] altitude switches and long delay digital timers, advanced explosive devices can be made to detonate at a predetermined location or time.[8]

Since the early 1980s several attempts have been made to destroy aircraft by using plastic high explosives (which are notably potent substances, the qualities of which will be discussed below) and many hundreds of deaths have resulted from successful acts of sabotage.[9] The Lockerbie disaster illustrated the destructive powers of plastic explosives, traces of which were found in the wreckage of the Boeing 747. There can be no doubt that the employment of plastic explosives by terrorists poses enormous new threats to travellers which were not faced when rudimentary improvisation was terrorists' only available line of attack. Home-made bombs were often easily detectable, even by simple screening processes, because they required to be large to contain sufficient explosives to inflict damage upon a target and because they often needed to be packed in robust, metallic containers such as steel pipes, which could withstand the necessary build-up of explosive pressure from within.[10]

Plastic explosives incorporate such agents as oils, synthetic rubbers or plasticised nitrocellulose (itself an explosive substance) to obtain a mouldable consistency and to promote stability.[11] The resultant substances can be over twice as explosively potent as equal masses of dynamite and can have a detonation velocity 15% faster than TNT, offering terrorists an ideal destructive medium which can be

[6] Fordham defines high explosives as:
"Literally any explosive which detonates. [ie. undergoes an explosion process of high speed involving a sustained shock wave.] In practice, the term is usually confined to explosives which do not normally burn to detonation but which require a detonator for use." S. Fordham, *High Explosives and Propellants* (Oxford: Pergamon, 1966), p. 215. Parenthetic sentence added from p. 214.

W. Powell, *The Anarchist Cookbook* (New Jersey: Lyle Stuart, 1971), p. 113 provides practical instructions on the processes required to produce TNT.

[7] Clutterbuck (1990) II, p. 11.

[8] Dobson and Payne (1979), pp. 113 - 118 and 124 - 125; G. Knowles, *Bomb Security Guide* (Los Angeles: Security World Publishing, 1976), pp. 40 - 41 and 109 - 110. For an analysis of sophisticated firing mechanisms see Clutterbuck (1987), pp. 11 - 12.

[9] Statistics can be found in President's Commission (1990), pp. 160 - 169.

[10] *Aviation Week and Space Technology*, 16 January 1989 (reprint).

[11] Fordham (1966), p. 36. See B.L. Stewart in Lewis and Kaplan (eds.) (1990), p. 65. The explosives themselves can function without such agents, often being found in powder form.

concealed in comparatively small consignments yet which are nevertheless formidably powerful.[12] In particular, a property of plastic explosives which appeals to terrorists is their capacity to shear metals through the generation of massive waves of pressure, causing virtually instantaneous and irrecoverable destruction of the target being attacked.[13] Legitimate and intended uses of many high explosives are often very different to the illicit purposes of terrorist groups. In industry and engineering, for example, they can be employed as explosive welders and metal formers.[14]

The potency of plastic explosives, which were developed at the beginning of the twentieth century as a light military compound,[15] is derived from their nitrogenous character. As Roger Highfield, the science editor of *The Daily Telegraph* pointed out after it had become apparent that the Lockerbie explosion had probably been caused by a high explosive:

> "The bomb was probably made of high-performance plastic explosives.
>
> This category, also known as shock-wave detonating explosives, includes many explosive chemicals.
>
> But the chemical composition of the most compact and thus the most ideal for terrorist use includes a chemical group called a nitro group, consisting of nitrogen and oxygen atoms (NO_2).
>
> It is a key to the explosive's high performance, ensuring that the explosive molecule has enough oxygen to burn fast enough to make a bang."[16]

The Czech family of explosives known as Semtex (a brand name owned by its producer Synthesia, though often used incorrectly to describe the generic grouping to which it belongs) is, in fact, composed mostly of two high explosive substances, cyclotrimethyl trinitramine (also known as RDX and cyclonite) and pentaerythryte tetranitrate (PETN). When these nitrogen-based compounds are mixed, typically in equal amount (44.5 per cent each) with a plasticising agent, such as a mineral oil, they form a malleable and much more thermally stable substance, which

[12] *Science*, 13 January 1989 (reprint); *Time*, January 1989 (reprint); Wilkinson (1989) IV, p. 4.

[13] *Discover* June 1986, p. 26. For a discussion of the effects of explosive devices on aircraft see E. Newton, "Investigating Explosive Sabotage in Aircraft," *International Journal of Aviation Safety* 1985, p. 43.

[14] *Science* 13 January 1989 (reprint).

[15] *Discover* June 1986, p. 26.

[16] *The Daily Telegraph*, Thursday 29 December 1988 (reprint). For a concise discussion of high explosives' characteristics and individual qualities see T.C. Tompkins, "The Terrorist Arsenal - Part 2," *TVI Report* 6(4) (1986).

may be flattened and moulded for purposes of concealment.[17]

Once constituted, plastic explosives retain their potency for many years, enabling terrorist groups' supplies to be transported in safety and stored for long periods.[18] This is further promoted by the explosives' remarkable stability and often relatively low sensitivity.[19] In certain circumstances, they can be handled roughly and subjected to extremes of heat in near total safety, because a specialised initiating charge, such as mercury fulminate or lead azide, is required to ignite the substances.[20] So safe are many plastic explosives that US military supplies were even used as emergency camp fuel by US Green Beret soldiers who were supplied with it on account of its excellent shattering quality (brisance).[21] If buried for twenty years, Semtex would allegedly remain elastic and maintain its awesome destructive powers.[22] Certain brands of plastic explosive, such as Du Pont's "Detasheet" are fully waterproof, being able to be employed in a wide range of conditions.[23]

The feature of plastic explosives which must be most attractive to aviation terrorists is their ability to evade detection by most currently employed security screening equipment and by animal searching techniques, as a result of their low vapour pressure (that is, their tendency to evaporate in air) and their odourless quality. As an example of the difficulties involved in detecting plastic

[17] *New Scientist*, 7 January 1989, p. 23. Adams has charted the short history of the product:

> "The explosive is manufactured by the Czechoslovakian government at Pardubice, sixty miles east of Prague. The factory first produced the explosive for military and civilian use at the end of the 1960s, and by the beginning of the 1970s it was being sold outside the Warsaw Pact." J. Adams, *Trading in Death: Weapons, Warfare and the Modern Arms Race* (London: Century Hutchinson, 1990), p. 28.

While Semtex products have been available only since the late 1960s, the two explosive components involved in its production were both discovered in the mid to late 1890s and have been widely used since. Fordham (1966), p. 36.

[18] Dobson and Payne (1979), p. 113.

[19] J. Stoffel, *Explosives and Homemade Bombs* (Springfield: Thomas, 1972), p. 36.

[20] *Unconventional Warfare Devices and Techniques: Department of the Army Technical Manual TM 31-200-1* (Washington D.C.: Department of the Army, 1966), p. 42.

[21] *The Boston Globe*, Friday 23 December 1988 (reprint); *Time*, January 1989 (reprint); Knowles (1976), p. 39.

[22] *The Daily Telegraph*, Friday 23 March 1990, p. 1.

[23] Stoffel (1972), p. 56.

explosives, it has been estimated that dynamite is typically 50 million times easier to locate by its emitted vapours than pure cyclonite.[24] One beneficial consequence of this is that if plastic explosives are produced or stored in close proximity to more easily detectable compounds, they can accidentally become adulterated and so lose a measure of detectability. On the other hand, some unscrupulous screening equipment manufacturers have taken advantage of this fact to claim that their equipment can detect plastic explosives, without revealing their inadequacies in terms of identifying them in their pure forms.[25]

Together, plastic explosives' longevity, stability and low vapour pressure pose major counter-terrorist problems for authorities, because once in the control of terrorist groups the compounds can be transported in bulk and stored for long periods with ease and without risk of detonation. The dimensions of the problem were highlighted in October 1987 when more than two tons of Semtex were intercepted by French customs officials en route to Irish terrorist organisations.[26] Had the *Eksund* (the vessel which was carrying the consignment) reached its destination, the explosives could easily have been divided into small, concealed batches and distributed to assembly points without detection.[27]

On 22 March 1990, Vaclav Havel, President of the newly democratised Czechoslovakia, revealed the extent of the previous regime's willingness to supply unscrupulous states with large amounts of Semtex.[28] Wilkinson has been quoted as claiming that production of Semtex alone could have totalled as much as 40,000 tons since the early 1970's, despite previous Czech communist party insistence that only half that amount had been made. Irrespective of Havel's assurances that production had ceased after the Lockerbie atrocity and of doubt concerning the precise amounts in circulation, it is clear that a serious security crisis has been presented with the upsurge of threat throughout the 1980's from terrorists' use of plastic explosives.[29]

Although it is true that all risks cannot be guarded against at all times, it is evident that currently very few are being addressed by authorities with any significant degree of dedication. In order fully to explain the reasons for this major security problem and so as to illustrate the response dilemma for the future, attention must turn to the three principal traditional forms of screening which have become

[24] *The Daily Telegraph*, Thursday 29 December 1988 (reprint); E. O'Ballance, "Aviation and Airport Security," *Gulf Report* 2/21 (1989), p. 18.

[25] McGuire (1989), pp. 3 - 4.

[26] O'Ballance (1989) I, pp. 18 - 19.

[27] Information received from Professor Paul Wilkinson, March 1990.

[28] See quote at start of Chapter.

[29] *The Daily Telegraph*, Friday 23 March 1990, p. 1.

established as standard features at most international airports: hand searching, metal detection and X-radiography. First, however, it is necessary to consider the possibilities offered by cooperative measures to outlaw the production of certain types of plastic explosive.

5.2. Tagging Plastic Explosives

In addition to the need for security technology to improve the detection of currently elusive explosives and handguns, action can be taken on the supply side to tag, or mark, the offending articles to make detection and identification easier. The amount of plastic explosives in illicit, but open, circulation worldwide cannot accurately be determined, but is bound to be extremely large, with as much as one thousand tons of Semtex having been provided by Czechoslovakia to Libya alone. As the shelf-life of the substance is very long this means that, even if production were immediately to be curtailed, its future as a terrorist weapon would be secure for centuries - a scenario envisaged by President Havel.[30] This problem does not, however, relieve governments of their responsibility to investigate means of stemming the flow of Semtex and other similar compounds into the hands of terrorists in future. Indeed, it should also compel them to find ways by which such undetectable substances can be made less likely to succeed against aviation and other major civilian targets.

There is no practical reason why currently undetectable firearms and explosives, including detonators, detonating cord and primers, should not be produced with traces of detectable material to make security processes more certain of success and/or with an added chemical "tag" which could be sought in order to determine their origin.[31] Politically, however, each of these options poses problems which, though not insurmountable, would involve long and detailed intergovernmental bargaining to resolve.

First, in the case of adding substances detectable by conventional screening equipment, as the explosives and firearms have a military use, such an ingredient might be unacceptable to armed forces which value the evasive property. As evidence for this, it was reported in 1989 that a major gun manufacturer told the US Airline Pilots Association that despite the ease with which adulterating chips could be lodged in plastic weapons to make them detectable, the firm's main customer was the US military, which would not countenance such a proposal.[32] This stance highlights the difference of outlook which so often exists between different branches of state on issues of national defence and terrorism suppression. Nevertheless, despite the military considerations involved for many states, the democratic Czech authorities' decision to end lucrative exportation of Semtex until a screening taggant can be found and added to the manufacturing process is one which should be followed by other plastic explosives producers,

[30] BBC Radio 4, *The World at One*, Thursday 22 March 1990.

[31] Clutterbuck (1990) I, p. 59.

[32] *The Independent*, Wednesday 26 April 1989.

whether commercial or under the control of armed forces.[33]

It could be argued that if governments heed the interests of their military forces and continue to permit the production of weaponry and substances which are of such great benefit to politically-motivated offenders, then they have a moral obligation to ensure that such production is stringently controlled, that stock-piles of existing explosives are kept secured or are progressively destroyed and that only legitimate, state-controlled agencies have access to remaining, unadulterated products. Alternatively, if, as seems likely, production continues unabated in many countries, the international community should at least admit that it should provide the aviation industry with whatever support is needed to introduce appropriate detection capacities at airports.

Second, for each state to agree to tag its production, even with chemicals which would be undetectable to screening systems but which would allow consignments' origins to be traced, would require well planned, administered and monitored processes, which might in themselves be expensive, very time-consuming and problematic in terms of gaining general support. In such circumstances, the international community might be faced with the same type of political dilemma over action against recalcitrant states which plagued ICAO's air crime conventions. On the other hand, fear of sanctions by non-cooperating states might coerce many of them into an international regime.[34] Ultimately, the effectiveness of any internationalised tagging system would be dependent upon the familiar factor of conforming states' willingness to act against recalcitrants - a factor which has caused the downfall of more than a few counter-terrorism policies.

Irrespective of the military and economic arguments which might be forwarded concerning explosives adulteration, the use of chemical taggants should be promoted by responsible governments. In the case of facilitating detection, there can be no valid reason for industrial, or even military consumers of plastic explosives to object to the compounds being adulterated with, for example, a substance readily detectable by simple screening methods, such as X-ray inspection, metal detection or gas chromatography. Metal filings and chemical vapour taggants can each help in this respect, though it would be vital to determine accurately the effects of including additives to high explosives. Identification tagging can also be achieved by adding non-explosive substances to consignments before leaving their factories. Clutterbuck has described one method as follows:

> "The method - developed by 3M in Minnesota and manufactured by the Microtrace Corporation - comprised the incorporation of 'microtaggants' in explosives during manufacture, consisting of particles of colour-coded melamine plastic. A large number of colours can be used and these are easily changed, so the number of permutations and combinations is almost infinite. This would enable the manufacturer to use a different combination of colour

[33] *Daily Telegraph*, Friday 23 March 1990, p. 1.

[34] Clutterbuck (1990) I, p. 56.

codes for every batch of explosives manufactured and the system would require this coding to be recorded each time any of this batch is sold to a wholesaler, retailer and user, anywhere in the world."[35]

Legitimate military consignments of plastic explosives supposedly destined for armed forces or exported under that pretext to governments which sponsor terrorist groups can and often do reach organisations which should have no channel of supply. If progress is to be made, east-west discussion and agreement will be required with a view to reaching consensus on which states should be refused sales of the explosives on security grounds. This would encourage the isolation of the governments concerned, although its ultimate effectiveness would depend entirely upon the forlorn hope that state sponsors of terrorism would not then seek to initiate or step up their own domestic production of Semtex surrogates.

5.2.1. Towards an International Tagging Convention

Precipitated by the international outcry following the Lockerbie bombing, the ICAO Council decided on 30 January 1989 to establish an Ad Hoc Group of Specialists on the Detection of Explosives. Furthermore, it adopted on 16 February 1989 a Resolution calling, among others things, for "an international regime for the marking of explosives for the purposes of detection." Accordingly, a meeting of the Ad Hoc Group took place between 6 and 10 March 1989, reporting to the ICAO Council, which referred the report to the Organization's Committee on Unlawful Interference. By July the support and mandate of the UN Security Council had been received by ICAO and a decision had been taken to commence work on a new legal instrument on the subject. Encouraged by the unanimous support of the ICAO Assembly, meeting between September and October, and by the UN General Assembly's December Resolution on the matter, a special Sub-Committee of the Legal Committee convened in Montreal, with eighteen states as members and with thirteen observers, from 9 to 19 January 1990 to commence work on the question of marking explosives for purposes of detection.[36]

It is curious and unfortunate that the concomitant aspect of marking for identification was avoided by states, although it is predictable that any attempt to introduce a system which could allow for supplies of explosives to be traced might meet with opposition from states concerned that the international community should not adopt the role of policing sovereign powers. Furthermore, at a time when the production of undetectable handguns and other dangerous but non-explosive items is increasing, it is regrettable that no mention was made of any broader threat. Nevertheless, even without any references to identification tagging and plastic firearms, the Sub-Committee was aware that it could introduce sweeping reforms in at least one

[35] *Ibid.*

[36] ICAO Legal Committee, *Working Paper LC/27-WP/3, 22/1/90.* pp. 1 - 2; ICAO Legal Committee Sub-Committee for the Preparation of a New Legal Instrument Regarding the Marking of Explosives for Detectability, *LC/SC-MEX-REPORT, 19/1/90.* p. 1.

important area - detection marking. The importance to the group of the work in hand was emphasised in its report in the following terms:

> "All Members and Observers agreed that there was need for the preparation of a new instrument which should be effective and capable of entering into force on a wide basis as early as practicable."[37]

Inherent in this desire, however, is a failure to grasp that effectiveness, swift entry into force and wide membership are rarely compatible elements on issues which are potentially divisive. It is true that the impetus for progress came from nothing less than unanimous resolutions from the UN Security Council and General Assembly and from similar calls from ICAO's bodies, yet the group's aims may be less easily won in the political forum of a diplomatic conference convened for the purpose of settling upon a final draft. This is due to take place early in 1991.

At its meetings, the Sub-Committee had before it a report submitted by the eminent British air law expert, Arnold Kean.[38] The document proved to be vital in the formulation of the Sub-Committee's proposals, although not all of Kean's suggestions met with support. In essence, he proposed that an international regime should be set in place to organise and oversee the chemical tagging of new stocks of undetectable explosives, to outlaw the manufacturing, preparation, packing, transfer and use of undetectable explosives and to oblige states to confiscate any batches of said explosives found within their territories.[39] He successfully submitted that rather than tie the instrument's application to any existent air law (such as ICAO's constituent agreement, the Chicago Convention 1944, or either of the air crime conventions of 1970 and 1971) the Sub-Committee should produce a free-standing convention of general application and with no particular emphasis on aviation, so that any organisations with an interest in the matter should not feel alienated.[40] Hence, Kean proposed that for the first time, ICAO should formulate standards competent across a field of application broader than its traditional remit.

The most important innovation introduced before the Sub-Committee and accepted by it was a proposal for an Explosives Technical Commission (ETC) to be established and empowered to specify (or at least to recommend) which explosives should be covered by the agreement and what action should be taken to make them detectable to standard

[37] *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, p. 7.

[38] Kean, *Report of the Rapporteur on the Subject of the Preparation of a New Legal Instrument Regarding the Marking of Explosives for Detectability*, in *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, pp. 23 - 36.

[39] Kean, *Rough Draft of Proposed Convention*, in *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, Articles 2(1) and 8; *Draft Convention*, Articles I - III.

[40] *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, p. 23.

security screening equipment.[41] The ETC would comprise experts in the fields of explosives manufacture and detection. It was suggested that fifteen members serving for a period of three years would be appropriate for the body and that regional representation should be encouraged.[42] If real decision-making powers were to be granted to a new Commission by ICAO members, an important step towards regulation of security-related matters would be achieved. Hence, as with the application of the instrument, so the notion of a purpose-specific Commission would represent an intriguing new departure for ICAO in its activities concerning crime suppression. Together they would form a concrete recognition on the part of the Organization that the issues involved in aviation terrorism impact upon other areas of interest, and that the rapidly evolving criminal threats faced need the attention of an organic authority, rather than merely the coverage of a fixed legal document.

Combined with the creation of a Commission, it was agreed by the Sub-Committee that the proposed convention's Annexes, which would contain details of explosives covered and appropriate action to be taken in respect of them, should command a legislative position higher than existing ICAO Standards by being subject to uniform and universal application by all states accepting them.[43] Once more, this decision to present a diplomatic conference with a provision of high quality marks an unusual level of commitment on the part of an ICAO group and is, therefore, to be praised. As with the other above-noted innovations, however, it is hoped that the climate of goodwill and cooperation which characterised the preliminary stages of the draft's development will continue into the final diplomatic phase, when political questions of state sovereignty and suspicion will almost certainly need to be answered and overcome. In the atmosphere of a global, plenary forum, it would be easy for considerations of competence, expense and domestic jurisdiction to militate against the creation of a broadly based convention, the establishment of an ETC and the formation of firm regulations. It is even conceivable that, faced with a robustly worded and clear-sighted draft, some delegations might take fright, argue for continuing municipal control and either dilute the proposed provisions or else reject the whole.

In terms of wordage, Kean's most lengthy proposal in his draft Convention was a collection of articles attempting to extend the *aut dedere aut judicare* doctrine to the acts involved in manufacturing, distributing and using unmarked plastic explosives.[44] In common with the Montreal Protocol 1988, the draft sought to impose an internationalised criminal justice system based on the Hague and Montreal Conventions. To their great credit, the majority of states

[41] Kean, *Rough Draft*, in *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, p. 29. Article 1; *Draft Convention*, Article IV - VI.

[42] *LC/SC-MEX-REPORT, 19/1/90. Ibid.*, p. 15: *Draft Convention*. Article IV.

[43] *LC/SC-MEX-REPORT, 19/1/90. Ibid.*, p. 9.

[44] Kean, *Rough Draft*. Articles 2 - 7, in *LC/SC-MEX-REPORT. 19/1/90. Ibid.*

represented on the Sub-Committee rejected this idea as being unnecessary and undesirable. Recognising that existing criminal laws would almost always be sufficient to secure convictions if states were willing to prosecute and perhaps even considering that the Hague formula on detention, extradition, prosecution and possible punishment contained too many loopholes to make it reliable as a vehicle for standardisation, the way of previous deliberations on air crime was avoided. Above all it was noted that attempts to gain state support for a criminal provision would dissuade some governments from acceding to the more important norms concerning "regulatory prevention" (such as the role of the ETC and the question of tagging) thus postponing the agreement's entry into force. In the interests of simplicity, the inclusion was not made.[45]

Another two of Kean's suggestions which met with little support were the idea that, in common with previous ICAO agreements,[46] special concessions should be given to states' military, police and customs authorities in their possession and use of unmarked concealable explosives[47] and the related notion that states should be allowed to file a difference against recommendations of the ETC.[48] Rather ambitiously, the Sub-Committee confidently declared its contrary view:

> " ... all explosives manufactured, imported or exported must be subject to the marking requirement without any exception whatsoever, since otherwise the very purpose of the new instrument would be seriously jeopardised."[49]

It seems possible that certain states' military forces would be unwilling to see their powers to produce undetectable explosives vanish, despite the fact that the unmarked compounds' principal association has been with the internationally unlawful bombing of civilian targets. The question which remains is whether states will share the Sub-Committee's attitude towards the instrument and opt to restrict their armed forces' freedoms, or whether the concession will be restored in the conference. On the other hand, military policy makers can take solace from the inability of the Sub-Committee to find any reliable means of marking the huge existing stock-piles of explosives and from its unwillingness to advocate the phased reduction of available surpluses. The argument in favour of allowing the continuation of currently available supplies seemed to be a purely economic one revolving around the need to encourage broad and early application of the agreement with poorer nations as well as richer.[50] A more effective (though also more adventurous) solution might have been to proceed with the elimination of all unmarked explosives over

[45] *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, pp. 10 - 11.

[46] Chicago Convention 1944, Article 3(a) and (b).

[47] Kean, *Rough Draft*, Article 9, in *LC/SC-MEX-REPORT, 19/1/90.*

[48] *Ibid.*, Article 1(8).

[49] *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, p. 11.

[50] *Ibid.*, pp. 11 - 12.

three to five years, as had been suggested in the Sub-Committee, in the hope that major nations might offer trading partners a "new for old" exchange, monitored by an international agency. Such an option is still available and should be considered at the drafting conference in preference to the more vague obligation to "exercise strict control" over unmarked stock.[51]

5.2.2. Questioning the Value of Global Regulation

Although a strong case can be made for regulating the production and use of plastic explosives on a global scale, and despite the benefits which a stronger regime than that proposed by ICAO would have to offer, it is essential to note that no legislative response could be expected to provide anything approaching a viable solution to the difficulties posed by terrorists' possession of the substances.[52] As has already been emphasised, the supply of totally unmarked explosives in the control of some terrorist groups and their state sponsors is enormous and could provide for several thousand attacks for decades to come. In view of this, it is tempting once again to regard this latest ICAO initiative as being too little, too late. Nevertheless, the plan should be examined in terms of its objectives and means of operation before any firm conclusion is reached.

On the issue of specifying the Convention's coverage of explosives, it is going to be difficult, if not impossible, to pin down the entire range of substances available at any given time and to know which new chemical compounds have been developed.[53] Equally, while some effort may be made to seek information from states concerning their production, it will not be possible to force governments to reveal all their production data, to stop clandestine manufacturing or to take steps against private producers operating without state permission. On a more fundamental point, if explosives of the type covered by the convention are difficult to identify through normal screening systems, their international carriage will continue irrespective of supposed global regulation. Hence, at best the agreement will be completely unenforceable until such time as practical measures are taken by states to introduce new technologies which can find the compounds - and so give the convention some meaning.

An unfortunate but entirely predictable outcome of early drafting activity has been the total exclusion of any provision governing sanctions in the event of breach of the promulgated standards. Without any undertaking to impose punishment the convention must remain one of ICAO's gentleman's agreements. Of course, there can be no way in which states could be expected to subscribe to a dedicated standardisation regime and still expect swift and maximum implementation, but the inevitable cost of tolerating such weakness must be that the unregulated, decentralised and totally inefficient

[51] *Draft Convention*, Article III, in *LC/SC-MEX-REPORT, 19/1/90, Ibid.*

[52] McGuire (1989), p. 3.

[53] Also, it is likely that certain terrorist groups enjoy the capacity to produce very powerful explosives, irrespective of the vagaries of state sponsorship. H. Ribak in Lewis and Kaplan (1990), p. 164.

methods of imposing communal sanctions on recalcitrant states will continue, placing abusers of explosives technology in a very strong position in which they can afford to continue their anti-social activities. It remains to be seen how western states will react when faced with breaches of an explosives convention committed by economically-important trading partners (and particularly those with oil trading or joint venture interests).

Another basic problem is noted in the restrictive scope of the agreement. Plastic explosives have been identified as requiring a regulatory framework simply because it is these substances which have been perceived as having caused a great many deaths in a short and recent time period. This correct observation fails to recognise that many other dangerous compounds cannot be located with conventional X-ray and metal detection techniques and require to be given similar attention. Among these items can be listed simple but deadly incendiary devices which are perfectly capable of causing fatal fires on board aircraft, poisons which could achieve the same end result in less violent ways, non-fissile nuclear materials which could be lodged in aircraft and made to exude radiation on passengers and crew over long periods and even nuclear bombs (a highly unlikely, but increasingly possible option which should not be discounted in future years). Although it should never be denied that it would be impossible to guard against all dangerous substances being developed and used by terrorists, it should also be stressed that a grave danger exists of states concentrating on one high-publicity threat at the expense of many others.

An inevitable conclusion to be drawn from the above is that the formation of a new regime can only acquire meaning if it is accompanied by enforcement action by concerned major states (ideally the Summit Seven and the democratising powers of eastern Europe) and is deliberately linked with progressive efforts to develop and install new technologies and to improve security techniques of all types at locations where preventive activities are required. Having decided that a new regime on explosive tagging may still have some positive contribution to make in a much broader struggle against political violence, it is necessary to consider the options remaining to be decided upon for any future agreement.

5.2.3. Continuing Difficulties and Drafting Options

Although the proposals arrived at by the Sub-Committee contain several useful elements, there are other problems yet to be resolved in their later stages of development. Chief among these is the need to formulate agreement on the question of amending the convention's Annexes which would contain necessary information on the explosives and taggants covered in the main text. Inevitably, advances in technology will require a flexible means by which changes to the Annexes can be incorporated swiftly and completely, such that the document retains its currency and is sufficient to meet the threat posed by newly-produced plastic explosives. In discussions, three possible means of amendment were presented for consideration:

1. amendments would be prepared by the ETC and adopted by the ICAO Council, thus binding all parties;

2. a conference would be convened, deciding by a two thirds

majority and requiring individual state ratification of decisions to protect states' sovereignty;

3. the ETC would draft proposals for change which would be sent to states for their comments; in the absence of objections the proposals would become operative; otherwise a diplomatic conference would be called to consider the matter.[54]

There is no doubt that, taken equally at face value, option one would represent the most efficient and clear proposal, but would pose the most obvious threat to states' closely guarded freedom of action. Option two is a politically realistic suggestion, but one which is cumbersome and unlikely to allow for swift implementation of reform. Only option three combines the elements of realism and potential effectiveness to produce a compromise which might still allow for moderately efficient reform. It is perhaps an indication of the difficulty entailed in balancing the factors involved that none of the three options (plus a more complex compromise presented by the United Kingdom's member) gained sufficient support to be adopted by the Sub-Committee.[55] After referral to a Drafting Group composed of six states,[56] the question was addressed once more and it was decided - along the lines of option three, above - that amendments proposed by the ETC and circulated to States Parties would enter force unless rejected by a number of States Parties (the number to be decided). Objectors would consult with the Commission and, if the disagreement remained, could maintain the objection and force the convening of a diplomatic conference.[57] It was suggested by some Members of the Sub-Committee that in the interests of "stability and uniformity" even one dissenting voice should be enough to call a diplomatic conference.[58] Although the consequences of this could include a grievous over-reliance upon resort to major problem-solving methods for minor disagreements, it is hard to deny that the maintenance of universal consensus on the issue calls for nothing less. Above all, a new regime on marking should aim to provide certainty and to prevent splintering of opinion on the questions of explosives and taggants. Whether such aims are too ambitious will be determined by the states themselves, first in the drafting conference and later in the operation of the convention.

On a related matter, the Sub-Committee was unable to reach agreement on the procedural code to be followed by the Commission and decided (by its only indicative vote - twelve to six) that the Draft Convention should contain no guidance on the ETC's Rules of Procedure, which it noted could be formulated after the agreement had come into force.[59] In the absence of such a provision, it would be impossible

[54] *LC/SC-MEX-REPORT, 19/1/90*, pp. 9 - 10.

[55] *Ibid.*

[56] *Ibid.*, p. 13.

[57] *Draft Convention*, Article VI, in *LC/SC-MEX-REPORT, 19/1/90, Ibid.*

[58] *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, p. 17.

[59] *Ibid.*, p. 15.

to predict how the Commission might take its decisions and, in particular, what voting procedures it might adopt. This would not constitute a significant problem for a body empowered only to produce recommendations of no binding force, but it could lead to embarrassing disagreements and delay if the Commission were given the capacity to formulate more concrete, and thus more politically-divisive standards. For this reaon it would be wiser for the drafting conference to settle upon a firm set of Rules of Procedure in advance of the formation of the ETC.

Another issue still to be decided upon is the location in the convention of definitions of such key terms as "explosives", "marking of explosives" and "detection agent". One option presented by the Sub-Committee is to place definitions in the Annex section, thus allowing changes to be accommodated with ease, provided a streamlined mechanism could be arrived at for producing necessary changes when needed. Another is to include a definitions section in the first article of the document, so as to become a concretised and less easily amended piece of international legislation. A useful compromise, suggested in the Sub-Committee, might be to include the fundamentally important aspects of definitions in Article 1 but to leave the potentially changable details for the more pliable Annexes.[60]

One worrying feature of the Sub-Committee's draft "Alternative A" which should not be permitted to be retained at the diplomatic conference is its reliance upon one means of security screening and a single mode of tagging. According to this wording, the marking of explosives would cover only the introduction of "an additional component which vaporizes, rendering the explosive detectable by gas analysis methods." By the same rationale, detection agents would constitute nothing more than "a substance having sufficient vapour pressure, which is introduced into an explosive as an additional component to render it detectable by gas analysis methods."[61]

It is unreasonable and unwise to place too much confidence in any one detection system - and particularly in gas analysis. At present, the use of the technique is hampered by the low success rates and/or the high false alarm rates of some models, plus the lengthy process of analysis and the high costs of others. Instead, the inclusion of a variety of taggants would make detection more predictable. If, for example, metal filings could be added, X-ray and metal detection systems (both of which are much more commonly used than gas analysis at airports) could be employed for the purpose. To overcome the problem the diplomatic conference could follow drafting "Alternative B" by leaving the convention silent on the details of explosives, taggants and detection possibilities, only to place them in detailed Annexes, which could be amended as required.

It was agreed by the Sub-Committee that an important feature of the new regime of explosives standardisation should be a continued

[60] *Ibid.*, pp. 13 - 14; *Draft Convention*, Alternatives A and B. Article 1, in *LC/SC-MEX-REPORT, Ibid.*

[61] *Draft Convention*, Alternative A, Article 1(2) and (3), in *LC-SC-MEX-REPORT, 19/1/90, Ibid.*

reliance upon existing security apparatus in use at places of sensitivity, such as airports.[62] This decision reflects a common contemporary inability to predict future trends in security technology. At a time when new generations of security apparatus are promised, it is difficult - if not impossible - to guage to effectiveness of these infant systems. It also signifies an awareness that different nations will always use different levels of security dependent upon factors such as wealth, threats faced and passenger throughput. Nevertheless, it is unfortunate that the Sub-Committee gave current technology such high priority without also stating the necessary accompanying fact that in future the detection of plastic explosives will require faster, more efficient equipment. This issue will be discussed below in the context of apparatus currently being refined and introduced into operation.

5.3. The Inadequacies of Traditional Security Screening

5.3.1. Manual Searching

It has already been noted above that the original techniques used in passenger screening prior to the development of technical means of security were those which depended upon labour-intensive and time-consuming physical examination of the baggage and persons of travellers. Even after the introduction of advanced systems, however, the physical approach continues to play a significant role in all security strategies, because it is regarded as the ultimate determinant of innocence with any suspicious object or person. Also, there is a deterrent effect in hand searching a proportion of baggage irrespective of prior screening indicators, as this can add a potential tier of possible security activity for a terrorist to consider when planning an attack.

Whenever technical devices have indicated that a danger may exist in the form of an unidentified object, it is the responsibility of security personnel to undertake a full inspection to ensure that the passenger in question cannot enter an aircraft with suspicious articles. For that reason it is crucial that staff be able to make a swift search in a dignified yet rigorous way and know what objects might be capable of concealing weapons and explosives. Unfortunately, not all terrorists use as their locus of concealment the more obvious hiding places, such as hollowed-out books and soft toys. Instead, the malleable properties of plastic explosives allow potent bombs to be constructed and placed, for example, behind the lining of a suitcase, with the compound rolled to minute thicknesses and attached to the walls of the case.

The security dilemma which is presented by this development is of special interest because it effectively renders unworkable as an operational absolute the use of baggage hand searching, traditionally viewed as the only foolproof method of back-up to fallable technical means. The piece of baggage which Nezar Hindawi packed with plastic explosives in an attempt to sabotage an El Al Boeing 747 on 17 April 1986 was passed by BAA security staff because the bag's false bottom, which concealed a compartment containing approximately three pounds of

[62] *LC/SC-MEX-REPORT, 19/1/90, Ibid.*, p. 7.

plastic explosive in sheet form, was not discovered. A pocket calculator which held a small quantity of plastic explosive, a timer and an initiating blasting cap, was adjusted in such a way as to make it fully functioning, were it to be investigated.[63]

Plastic explosive devices concealed within electrical and electronic articles were uncovered by police in the Federal Republic of Germany in October 1988, during a raid on premises known to be used by the Popular Front for the Liberation of Palestine - General Command (PFLP-GC). Some of the devices, including a Toshiba "Bombeat 453" radio-recorder, contained altitude switches, as used in more advanced aircraft bombs (although PFLP-GC leader Ahmed Jibril insisted that they were intended for attacks on road vehicles in mountainous areas).[64] Within the Bombeat was hidden a piece of plastic explosive measuring 180 mm x 60 mm x 22 mm and weighing 300 grammes, yet this block was itself disguised by a paper covering bearing a realistic Toshiba trade mark and the description, "SX 225 BW 3-Weg-Kompakt-Box." Elsewhere in the electrical parts an electronic timing device was found, covered with another Toshiba label, making it appear to be a legitimate component.[65]

In the investigation of the bomb discovery, various electrical goods were removed from the PFLP-GC base to police offices. While one of these, containing a bomb which had not been recognised, was being examined by a trained police officer it exploded, killing him and injuring a colleague. Difficulties of recognition are not unique to police departments: it would have been completely understandable for comparatively poorly trained security staff working to a tight screening schedule to have given the Bombeat or a similar explosive device security clearance.

Even allowing two major assumptions to be made, first that a terrorist was to attempt to infiltrate such a device in hand baggage and second that time was to permit a security officer to dismantle it for a detailed physical inspection, it is unlikely that anyone without reasonable proficiency in the electronic sciences would be in a position to identify the disguised bomb components. With a bomb concealed in the dense circuitry of personal computers or even simply following the specifications of the Bombeat device and dispatched by terrorists to the safety of hold baggage, it is also unlikely that it would be prevented from reaching one of an aircraft's baggage sections. Only trained eyes and informed minds would be likely to find the Bombeat features which Wilkinson has identified as being suspicious:

> "[Security personnel] might have been able to spot the clue that when x-rayed the radio-cassette player bomb appeared to contain more wiring than normal. But only careful manual inspection

[63]Vincent (1989), p. 7.

[64]For a detailed description of the bomb see S. Emerson and B. Duffy, *The Fall of Pan Am 103* (London: Futura, 1990), pp. 193 - 194.

[65]Bundeskriminalamt, *Getarnte Sprengvorrichtung, eingebaut in einem Radiorecorder*. (Wiesbaden: BKA, 1988), pp. 2 - 4.

> would have been able to detect the more obvious clues notified by the West Germans: the aerial jack plug was taped to the side of the radio and there was no wire attached to the jack plug; additional batteries and explosive material were not secured inside the radio-cassette player, and these loose items rattled inside the set if it was rotated. There is only one airline in the world operating the rigorous search methods that would have been likely to spot such a device without any prior warning and briefing as to what to look for and that is El Al. The rest of the world's civil aviation security systems simply do not have the technology or the human skills and knowledge to prevent another Lockerbie from happening tomorrow."[66]

Perhaps of even greater concern is the fact that radio equipment had been used to house lethal bombs on more than one previous occasion. On 21 February 1970, the casing of a radio was used to conceal a bomb which destroyed an Austrian Airlines Caravelle.[67] Fifteen years later, an Air India Boeing 747 broke up in flight after a radio bomb detonated in one of its baggage holds.[68] Because little progress appears to have been made in detecting concealed explosive devices, analysis must now be made of the problems encountered by technical security apparatus in locating threatening plastic items.

5.3.2. Metal Detection

It is axiomatic to note that any means of detection which is based specifically on identifying metallic compounds will find no application in the search for suspicious non-metallic substances. Metal detection was introduced instead as an entirely safe and uncontroversial method of verifying that passengers are not concealing undesirable objects about their persons prior to boarding an aircraft. In the early 1970s, when technologically-based screening was first being introduced systematically, the length of time required to frisk

[66]Wilkinson (1989) IV, pp. 5 - 6. Wilkinson's suspicions were confirmed when Mr Alan Feraday, a leading British explosives expert, testified to the Fatal Accident Inquiry concerning the Lockerbie incident that standard physical inspection and X-ray screening of the device used could have been expected to have found no indication of the presence of an improvised explosive device. *The Glasgow Herald*, Tuesday 23 October 1990, p. 7. Note also that in June 1990, a British Airways security staff member cleared the baggage of Dr Jim Swire despite it containing a device modelled on the widely publicised bomb design believed to have been used in the Pan Am flight 103 atrocity. At the time of the infiltration's disclosure, the carrier claimed that the employee responsible had taken pity on Dr Swire (whose daughter had been killed in the Lockerbie blast) and hence had not initiated a full scale search of his belongings. Whether this was the case, or else security systems simply failed to detect the replica, the example served as an indictment of the search philosophy utilised. *The Sunday Telegraph*, Sunday 1 July 1990, p. 1.

[67]Dudley (1976 - 77), p. 69.

[68]Jiwa (1986), pp 38 - 41.

and inspect each individual was deemed to be too great for the flow of passengers which was then developing.

For this reason, "walk through" archway metal detectors (AMDs) were introduced which used a magnetic field to detect metals. Brian Prosser, General Manager of the UK based security technology firm Aviation Engineering International Aeradio, has described the very basic technology involved in this first generation of devices:

> "The early metal detection gateways utilized continuous-wave techniques in which the amount of metal passing through them was detected by the size of the disturbance induced in the field, set up between transmitting and receiving coils. This method demanded some skill from the operator in the setting up and interpretation of the readings, and also tended to respond more to ferrous metals than non-ferrous objects."[69]

If the field were to be disturbed by the passage through it of ferrous compounds, a detector would notify security operatives with a sound-based and/or a visual alarm signal, indicating that the passenger should be given closer inspection. In time, this first generation of device was superseded by more advanced technology which identified many more types of metallic compound present around and within the bodies of passengers, rather than merely those which contained magnetic iron compounds. Also, much smaller amounts of metal were able to be found (sometimes less than 10 grammes) by the more advanced systems.[70] Pulse techniques came to be recognised as a useful means by which metal detection could be achieved because of their active determination of metal types and sizes through monitoring the response of the matter being screened to the electro-magnetic pulse field created.[71]

A difficulty with AMD techniques is the danger of "blind spots" and sensitivity variations within the field of the device. Recent reports of security agents being able to pass undetected through AMDs with handguns affixed to their ankles illustrates the need for magnetic fields to operate from floor level to well above average head height.[72] The thoroughness with which passengers are screened using hand held detectors is equally vital to ensure, by educating and monitoring security personnel in their utilisation. Although a portable device must be of a high sensitivity to be able to locate small amounts of metal quickly in a secondary search - an ability to locate as little as five grams of metal at five centimeters is a reasonable specification[73] - it must also be used discretely, so as not to embarrass or offend passengers being subjected to its scan.

[69]B. Prosser, "Aviation Security Systems have Grown to Match the Threat," *ICAO Bulletin* October 1985, p. 25.

[70]Publicity material for Graseby Security Ltd., 1990.

[71]Prosser (1985), p. 25.

[72]Interview with Canadian security expert, London, UK, 1 April 1989.

[73]ECAC (1988), paragraph 3.2.2 a).

Metal detection is a low cost means of screening passengers, with one brand of AMDs costing only £3,200 and hand-held units being priced at between £100 and £200.[74] The simplicity of metal detection has much to commend it, requiring neither special skills from nor detailed analysis by security staff, who need only act upon the alarm of the detector. The sensitivity of AMDs can be adjusted, so as to prevent staff from being forced to hand search each passenger carrying coinage, cosmetics packaging and other common metallic objects of low mass. As Dorey has noted:

> "The level of the range of sensitivity can usually be adjusted to ignore small objects of a pre-determined size, but to produce an alarm when a larger metal item, such as a weapon, is moved through the magnetic field.
>
> Another variable factor is the frequency of the field. High frequencies are able to provide greater signals from small objects made from copper, brass, aluminium and silver which have high conductivity, than from larger weights of metal such as iron and steel, which have low conductivity. Some walk through detectors operate on a low frequency to detect the higher metallic masses, whilst high frequency hand-held units are used subsequently to locate the suspect item with greater precision. One airport type detector operates within the range of 100 Hz - 800Hz, thus covering both the low and high frequency range...The latest walk-through machines using pulse techniques are capable of detecting the smallest quantity of ferrous and non-ferrous metal."[75]

When calibrated to alert staff of the presence of metallic matter larger than small objects which might normally be expected to be found in pockets, such as keys and coins, a throughput rate of up to 1,200 passengers per hour is reasonable to expect from an advanced AMD.[76] This figure would, however, require the addition of several staff to facilitate on-site physical searches and body frisks, with a personnel member exclusively overseeing the AMD.

A problem which applies to metal detection is, of course, the inability of the devices to detect non-metallic compounds such as plastic explosives. Most bombs require some form of built-in detonation, which in the majority of cases will require some metallic components to be present, either in the form of wires, tubes for containing an initiating charge, metal striking mechanisms, timers, batteries or springs.[77] Although it is certainly possible to calibrate the most advanced metal detectors in such a way as to detect even tiny amounts of metal in, for example, paper clips or staples, it would be inevitable that such a calibration would result in virtually every passenger requiring to undergo further types of screening.

[74]Publicity material for Graseby Security Ltd., 1990.

[75]Dorey (1983), pp. 233 - 234.

[76]ECAC (1988), paragraph 3.2.1 b) 8).

[77]Dorey (1983), p. 238.

Any significant reduction in sensitivity of screening devices would redefine their purpose from being largely preventive to being largely deterrent, because practical effectiveness would be subordinated to a lesser power merely to intimidate. This must imply that badly equipped prospective offenders will be likely to find the very presence of an AMD of indeterminate calibration a daunting test of their devices' construction and their nerve, but that, conversely, those confident of their devices' powers of evasion will not be diverted from their intended course of action.

As efforts to desensitise an AMD will, by definition, result in a lowering of its capacity to find small metallic objects, it is the entirely impossible task of security managers to determine an efficient level of operation which also provides sufficient sensitivity for the discovery of detonation devices, the minimum size of which can never be predicted in advance. The question of sensitivity and the problem of false alarms will be dicussed below in the context of new security technologies.

As an alternative scenario, terrorists could confound metal detectors with ease, simply by placing their advanced explosive devices in small personal stereo cassette tape players or other such metallic objects carried in clothing. If an alarm were to sound on passing through the archway, security staff might either retain the object (while the person carrying it made a second passage through the field) subsequently to return it, unaware of its identity, or else they might feed the object into an X-ray unit, which might be unable to form an image of the plastic explosives. Only a detailed and overly time-consuming physical search of such objects or an outright ban on carrying electrical and electronic items could come close to reducing this form of danger. Clearly, metal detection alone cannot be expected to provide a solution to the problem of terrorist technology advances.

Another worrying innovation which strikes at the effectiveness of metal detection processes concerns the threat from would-be hijackers who seek to evade detection of arms. Original screening devices have proved to be powerless to counter the development of low density arms and ammunition which have been used in a limited number of hijack attempts. An early, though highly advanced, example of this phenomenon is to be identified in the hijacking by Patrick Arguello and Leila Khaled of an El Al Boeing 707 on 6 September 1970. First generation metal detection equipment was already in use by the airline at the time of the incident, though it failed to detect the customised weaponry with which the terrorists had been supplied:

> "Arguello was armed with one hand grenade and a revolver, all made from non-ferrous metals. Weapons without steel in their construction need a special machine to detect them. Leila was armed with two grenades.
>
> The grenades looked like cans: cylindrical, smooth and straight-sided. They were packed with high explosives. Six inches long and one-and-a-half inches in diameter. The firing mechanism was similar to a Mills bomb: a handle locked into a plunger on the top by a pin. The plunger was connected to a detonator on a four-second fuse by a spring.
>
> Arguello's revolver had started life as an Italian starting

> pistol, made to fire blanks. Now it could fire .22 revolver cartridges. Someone, somewhere had drilled out the barrel and the twelve chambers and replaced all the steel parts, even the screws, with plastic. The gun was also of small calibre and low velocity to minimize damage to the structure of an aircraft."[78]

In the years subsequent to the Dawson's Field crisis, which was sparked by the El Al hijacking, research and development schemes were carried out by arms producers in West Europe and the United States to develop lightweight but effective handguns which would be largely or totally composed of synthetic materials and so would be immune from conventional detection screening processes, would be easily cleaned and would be resistant to corrosion. By the early 1980s western military forces had taken delivery of the new firearms, which were prized for their low weight and for the ease with which they could be concealed.[79] In 1986 tests of some of these weapons, proved that arms technology had exceeded that of detection, when plastic handguns failed to be identified in typical screening processes.[80] By 1990, more than one producer had developed a handgun which features no metallic components whatsoever, relying instead on an undetectable super-hardened polymer.[81] In addition to plastic handguns, research is also being undertaken by Japanese scientists into the possibility of using low density ceramics as a medium for weapons production.[82]

The particular danger of hijackers using non-metallic weapons was highlighted on 17 March 1986, when a Soviet-born prospective passenger carried an Austrian "Glock 17" nine millimetre handgun and 126 rounds of ammunition through a US National Airport security checkpoint without their being detected, in an attempt to take them on board a People Express aircraft.[83] This security failure is of particular concern as the weapon contained (in addition to its light, plastic body) several dense, metallic components - its barrel, slide and spring - which, in theory, could have been detected. It is immaterial that the Glock contains "a great big chunk of steel", as one FAA official described it, if that steel is sufficiently discrete as to

[78] P. Snow and D. Phillips, *Leila's Hijack War* (London: Pan, 1970), p. 10.

[79] M. Biaggi, *Testimony in Support of H.R. 4223 Dealing with Nonmetal Firearms Presented Before the House Subcommittee on Crime by the Honorable Mario Biaggi of New York*, May 15 1986, p. 2, issued as part of a press release received by the International Foundation of Airline Passengers Associations, Spring 1987.

[80] Press release from Representative Mario Biaggi, 16 April 1987, p. 30.

[81] Clutterbuck (1990) I, p. 53; Goodpaster (1986), p. 25.

[82] *Air Travel Journal*, 23 January - 5 February 1987, p. 7.

[83] Biaggi, open letter to US Congressmen: *Tools of Terrorism: Plastic Handguns*, 30 January 1987, contained in press release received by IFAPA; Biaggi, 15 May 1986, p. 2.

pass undetected through screening checks.[84] Even if the barrel, slide or spring had triggered an alarm, it is foreseeable that a poorly trained security operative simply might not have the ability to recognise that the isolated components of a disassembled Glock were actually part of a weapon.

In 1986, US journalist, Jack Anderson reported that Col. Muammar al Qadhafi of Libya had ordered several hundred of the polymer-based Glock 17s, a 9 mm weapon which can fire 17 rounds of ammunition and which retails at $440 (US).[85] By that time, over 10,000 Glocks had been imported legally into the United States, to the dismay of US Congressman Mario Biaggi, who had previously co-authored legislation outlawing armour-piercing ammunition in the United States,[86] against opposition from arms lobbyists. Biaggi gained publicity when, in February 1986, he obtained a Glock and infiltrated it through both X-ray and metal detection apparatus at the US Capitol, despite the weapon containing some 19 ounces of metallic components.[87] As he later noted in the House of Representatives, when promoting his ultimately unsuccessful Bill for a production, importation and sales ban on undetectable firearms in the commercial market:

> "Simply put, firearms technology has far surpassed the limits of our weapon detection systems and unless that gap is closed, law enforcement will be waging a losing battle against terrorism."[88]

Biaggi's observation of firearms technology could justifiably be extended to cover all areas of arms and explosives development. Moreover, the screening predicament which he correctly identified concerns more than merely metal detection processes.

5.3.3. X-Radiograghy

The adaptation of medical X-ray techniques for aviation security purposes was an important advance for passenger security, as it permitted a well-established and simple mode of screening to be introduced to the problematic airport environment. In principle, if X-ray beams are passed through objects, the articles' constituent compounds of different densities will attenuate - that is, absorb proportions of - the beams in different ways. If the residual radiation traces are then measured by a bank of diodes, a photographic or electronically generated "shadow" image of the objects' contents can be produced, providing that the compounds involved are not so dense as to have absorbed the entire beam or, conversely, are so molecularly light as to scatter the rays, producing an indistinct

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[84] *Aviation Week and Space Technology*, 16 January 1989 (reprint).

[85] *Air Travel Journal*, 23 January - 5 February 1987, p. 1.

[86] Biaggi, 15 May 1986, p. 1.

[87] W.A. Crenshaw (1987), p. 90.

[88] M. Biaggi, *Congressional Record - House*, 25 March 1987, p. H 1594, contained in press release to IFAPA.

shadowgraph.[89] Although such a weakness severely limits the effectiveness of traditional X-ray systems, these units remain popular with airports and carriers partly because, like metal detection apparatus, they are inexpensive to purchase and operate.[90]

Since the early 1970's when X-ray detection was first introduced to airports on a large scale, research and development efforts have been on-going with the intention of refining the technique, making it more effective and extending its scope of ability. As Dorey has observed, three types of X-ray technology came to be used as screening equipment at airports:

> "1. Pulse X-ray
> A low dose pulse of X-rays impinges upon the article being placed in the path of the beam and this shot is transferred to an image retention panel, from which it is electronically retrieved and transmitted to a television monitor for viewing.
>
> 2. Flying spot X-ray
> A low dose, vertically moving 'flying spot' of x-ray radiation about 3 mm wide scans baggage placed on a moving belt or conveyor as it passes a predetermined point. An image is sequentially built up on an image retention panel, and when the object has wholly passed the panel, the complete picture is transmitted to a television monitor for viewing.
>
> 3. Constant potential X-ray
> These machines may be of the high dose variety or have an adjustable range typically between 50 Kv and 200 Kv at a tube current of 5 mA. The article under surveillance is subjected to radiation for the whole of the period it is held in a cabinet, where the generator is operated by the closure of a door. Otherwise, the continuous X-ray beam is switched on when the photo-electric detector senses the presence of an article on a moving conveyor. The X-ray image can be viewed directly through the fluorescent screen or from a television monitor on to which the picture is projected. ... A constant potential machine producing a real time image is essential to detect liquids such as alcohol and petrol bombs."[91]

The first generation of apparatus relied on "direct viewing" of objects by staff via a fluorescent screen. The addition of a television camera focussed on the screen relieved operatives of the hazards of direct viewing, by allowing them to watch a monitor located at a safe distance from any source of radiation. Unfortunately, at least one manufacturer decided that by locating the monitor beside the

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[89] *New Scientist*, 7 January 1989, p. 23; *Aviation Week and Space Technology*, 28 April 1986, p. 31.

[90] One manufacturer advertised in 1990 a conventional X-ray system of high specification for £5,595. Publicity material for Graseby Security Ltd., 1990.

[91] Dorey (1983), pp. 223 - 224.

chamber's entry point a useful feature could be incorporated which would "allow the operator also to control the loading of bags into the machine."[92] While this certainly provided a cost-saving benefit for airports and carriers, it also encouraged over-reliance on one member of staff who could not reasonably be expected simultaneously to monitor the X-ray readings and the baggage flow. This form of managerially-inspired negligence remains one of the most frequently observed security flaws at airports.

Computer-driven digital storage and adaptation of X-ray images soon replaced televised imaging as the state of the art means of displaying scanning information. This resulted in a higher contrast picture, accompanied by a decrease in the amount of electronic noise. Overall quality over previously used analog storage systems was thus improved. Another advantage of using digital means of information supply is that the array of linear X-ray sensors can be aligned around the screening chamber to produce a complete image, unobtainable with ordinary cameras.[93]

The aforementioned conventional and familiar systems operate according to the same physical principles and produce monochrome images of low quality which require operators to study their viewing screens closely for suspicious signs. This level of technology is inadequate, being unable to reveal sophisticated devices and relying too greatly on the questionable skills of security staff. A feature often rated by manufacturers as being invaluable to screening staff is the ability of modern apparatus to produce "zoomed" close-up images of a section of baggage as well as of the entire object. Although definite theoretical benefits accrue from this, in practice the utility of the feature must be questioned. As screening staff have only two to three seconds to look at each shadowgraph, there is doubt that they can first scan each image visually, detect a possibly suspicious object, increase the magnification and examine the image more closely without drastically reducing efficiency.

The effectiveness of X-ray techniques can be described in terms of two factors: penetration, or the ability of a unit to present a useful image of dense matter when lesser systems would show it only as a black mark; and resolution, the capacity to display thin objects clearly.[94] ECAC specifications for X-ray equipment suggest that the ability to penetrate six millimetres of steel and to resolve as little as 0.16 millimetres of solid copper wire should be viewed as minimum acceptable performance levels.[95] In practice, X-ray systems able to resolve 0.10 millimetres of solid copper wire and penetrate twelve millimetres of steel can easily be identified.[96]

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[92]Prosser (1985), p. 25.

[93]A. Kotowski, *ICAO Bulletin*, October 1986, p. 23.

[94]*Ibid.*, p. 22.

[95]ECAC (1988), paragraphs 3.3 a) 4) and b) 5).

[96]Publicity material for Heimann, 1990.

Even assuming that the object being screened is of a density which can be displayed for the security officer to observe, the task of identifying suspicious articles can still be daunting. The often ambitious aim of officers watching shadow images of baggage being passed through X-ray machines is to discern differences in shading (normally over a range of grey) which might reveal dense, metallic objects, such as arms, wires and detonators.[97] Advances in arms and explosives technology and the increasing availability of modern bomb components have further compounded screening problems.

With traditional X-ray techniques,[98] low density compounds, such as plastics and nitrogen-based explosives, do not normally absorb beams of electromagnetic radiation sufficiently well to be traced by the appartus and displayed in shadow form for observing security staff to note. Even if they were to be displayed, in the rush of processing many bags, most security staff would probably find their images to be indistinguishable from those of ordinary articles around them.

The aim of security staff to locate suspect materials by using X-ray technology has always been complicated by the tendency of terrorists to disguise the objects which they desire to transfer through security points (such as when concealing explosive devices inside electrical, electronic or battery operated equipment, or when packing handguns so that they will be screened along an unrecognisable axis). Problems in screening are also caused by the presence in the majority of bags of metallic objects which produce unwanted electronic "noise", confusing the information instantaneously being received and analysed by staff. In turn this can lead to physical searches requiring to be undertaken, if security teams operate diligently, or else for suspect baggage to be permitted to pass by, in the interests of swift facilitation.

During the period before concealable, solid state electronics and advanced explosives, a reasonable objective behind X-ray screening was to reduce dependency upon lengthy and possibly cursory hand searches. Even under such comparatively favourable circumstances, it was still deemed necessary by aviation authorities to corroborate the findings of X-ray screening staff by mandating the additional hand-searching of a proportion of baggage (typically around 10%).[99] Furthermore, notwithstanding the widespread adoption of X-ray technology, the problems of time consumption and effectiveness were not completely avoided, because as with physical inspection, the role of the apparatus operator was still one of active observation and intervention, rather than one merely of response only to a warning signal from the machine (as with metal detection techniques):

> "The limiting factor is the number of bags which can be efficiently scrutinised by a trained guard in twenty minutes. This is the longest period in any hour that a guard should be required to gaze at the viewing screen. A 'cosmetic' type

[97] Dorey (1983), p. 221.

[98] For a full description of the first three generations of X-ray devices see Dorey (1983), pp. 223 - 232.

[99] ECAC (1988), paragraph 2.3.1.5. b).

> security screening is quite easy to achieve in allowing baggage to pass through a conveyorised machine at the rate of 1000-1400 bags per hour (3.6 - 2.6 sec each) claimed by some manufacturers. It is doubtful whether a guard can view the picture of the baggage contents, interpret what he sees and make a decision in less than five seconds, which equates to 720 bags per hour. This is the standard viewing time stipulated by the British Department of Trade. The faster the speed of the belt, the higher will be the rejection rate by a conscientious guard - who should stop the flow, have the bags opened, and identify the opaque objects. Thus a rejection rate of 30 per cent, which is not unknown, effectively reduces the overall speed from a claimed 1000 bags per hour to 700 per hour."[100]

At least one producer, Astrophysics (the market leader in airport security X-ray units, with 92 per cent of US sales[101]) has publicised a processing speed of 2,000 items per hour for one of its X-ray products, the Linescan System Eight device. The quoted rate equates to an exceptionally rapid screening time of 1.8 seconds per item, which must cause concern that screening staff operating the machinery at that optimal rate would be unable to make a reasonable risk assessment from images received.[102] Instead of advertising with pride the maximum conveyor speed of equipment, manufacturers would be well advised to consider promoting a speed which can permit practical human judgements to be made. Otherwise, such devices are in danger of being treated by managers and operatives alike as tools of swift facilitation, rather than of painstaking security. In such situations, the screening equipment becomes a tool merely of deterrence and public relations, with the devices serving to discourage less able potential attackers and to build confidence in the travelling public. Both of these purposes can be discounted once an act of air crime takes place despite the equipment having been used.

In addition to human constraints, advances of technology have caused difficulties for conventional X-ray machinery. Since terrorists have realised that effective bombs can be constructed from simple, easily accessible components and concealed, for example, amid the electronic and electrical contents of radio and recording equipment, the aim of finding suspicious objects at all has ceased to be so nearly viable.

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[100] Dorey (1983), p. 225. Despite a proven need for staff to be rotated around different duties, observation of security teams at airports often reveals a tendency for one person to operate screening apparatus for very long periods of time. In 1989, a US security employee disclosed that at least one company operated a policy of retaining personnel on X-ray machines, without any form of rotation. *Condé Nast Traveler*, March 1989, p. 36. Other evidence suggests that some airports merely rotate staff from one screening machine to another without an intervening break. E. Morris and A. Hoe with J. Potter, *Terrorism - Threat and Response* (London: Macmillan, 1987), p. 70.

[101] W.A. Crenshaw (1987), p. 140, f. 36.

[102] Publicity material for Astrophysics, 1990.

Instead of looking for the shadow images of such components as conspicuous wiring and large, dense batteries, operatives are now unrealistically expected to be able to identify such articles as tiny detonators, inconspicuous power cells and explosive compounds which under certain circumstances will be almost, or totally, undetectable using most existing security techniques.

It is fair to conclude, therefore, that the existing security screening technology and techniques of physical searching by semi-skilled or unskilled staff, metal detection and conventional X-radiography, are each insufficient to guarantee an appropriate level of security for airline passengers. Technological and other possible advances which might improve the industry's capacity to detect modern, state of the art weaponry will be dealt with below, in conjunction with a discussion of the unfounded presuppositions which inhibit politicians and security administrators from better promoting the true interests of security. One such presupposition which typifies the lack of understanding of many within the industry states that current security systems - if operated diligently - would be sufficient to prevent terrorist attack. This found expression after the February 1989 ICAO Council meeting on security, in the form of a statement from UK Transport Secretary Paul Channon:

> "Let us agree that as much checked baggage as possible will now be screened at the check in and when transferred between flights by X-rays, supplemented by a specified minimum level of hand searching."[103]

As terrorists had ably demonstrated to the Secretary of State their ability to conceal devices from X-ray and hand searching, Channon's sentiments must have been designed to allay the public's genuine fears of attack, rather than realistically to promote higher short term standards of screening accuracy. They can only be dismissed as an irresponsible public relations exercise which disguised the true nature of the crisis being faced and which sought to avoid addressing the obvious problems of aviation security.

In a later section, the development of X-ray security techniques will be discussed further, in the context of new technology which has revolutionised the method.

5.4. Conclusion

There is no doubt that conventional security screening devices found at most airports are obsolescent. If, however, further evidence of failure by security teams in major aviation powers is required, the findings of the US General Accounting Office in its report of July to US Secretary of Transportation, Elizabeth Dole, should be consulted.[104] In assessing the FAA's rules on security screening, the GAO noted that the Administration's tests (using metal-based weapons

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[103] *Aviation Week and Space Technology*, 20 February 1989, p. 117.

[104] U.S. General Accounting Office, *Aviation Security: FAA Needs Preboard Screening Performance Standards*. July 1987. GAO/RCED-87-182.

and devices) produced widely varying results and were based on procedures of dubious quality:

> "In tests conducted by FAA from September through December 1986, screening personnel detected approximately 79 percent of the test weapons for x-ray tests, 82 percent for metal detector tests, and 81 percent for physical search tests. Detection rates varied significantly among FAA regions, ranging from a low of 63 percent to a high of 99 percent. For major airports, the detection rate ranged from a low of 34 percent to a high of 99 percent.
>
> Moreover, our analysis shows that FAA test results may overstate the screening process' success in detecting weapons for at least two reasons: First, FAA test procedures are designed to favor detection of test weapons. For example, FAA inspectors are allowed to place only two or three objects such as a sweater, book, and shirt with a test weapon in the carry-on bag to be tested in an x-ray device. The tester cannot hide the test object among other objects in the carry-on bag or place other metal objects in the bag, as a saboteur might.
>
> Second, screening personnel may be aware they are being tested. This is because FAA inspectors in some locations are well known to screening station personnel."[105]

The post-Lockerbie public outcry over plastic explosives has turned public attention yet further to the weaknesses of airport security technology. It is reasonable to suggest that very many terrorist groups are aware of the weaknesses inherent in the global system and will take advantage of them until such time as authorities can successfully introduce more viable technologies and techniques to replace them. The question must arise, therefore, as to the nature of advances which are required throughout the world's aviation networks. The following Chapter shall show that, although weaknesses must always remain, a great deal could be achieved by introducing new generations of technology as they become available and as they prove their worth. Moreover, affordable security equipment must be made available for small airports and carriers as well as large, if terrorist groups are to be diverted away from the uniquely vulnerable aviation industry, instead of merely redistributed throughout it.

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[105] U.S. General Accounting Office, *Aviation Security: FAA Needs Preboard Passenger Performance Standards* GAO/RCED-87-182, 1987, p. 10. For a detailed outline of the test results quoted, see U.S. General Accounting Office, *Aviation Security: FAA Preboard Passenger Screening Test Results* GAO/RCED-87-125FS, 1987, pp. 8 - 18.

CHAPTER 6

TOWARDS AN AUTOMATED INTEGRATED EXPLOSIVES DETECTION SYSTEM

> "The major threat to civil aviation today is from sabotage bombing using plastic explosives, such as Semtex. Yet our airports do not have equipment installed which is capable of detecting plastic explosives. This is not because the technology to do this is not available. There are some excellent thermal neutron activation systems in prototype for example. It is because no country or group of countries has yet provided a mass produced machine for all its airports."[1]

> "The development of the TNA brings nearer the day when machines will be able to show whether or not a bag contains an explosive device. Whilst we await the outcome of the TNA experiment with interest, we do not consider that technology alone will solve the security problem."[2]

6.1. Introduction

Previous discussion of the weaknesses inherent in security screening methods which rely on human intervention prompt the conclusion that technological progress should be sought to assist in improving capacities and to overcome the unavoidable weaknesses of staff. Such a suggestion is supported by the findings of the Ergonomics Society which in the late 1980s carried out studies of screening activities and found that the accuracy of existing X-ray techniques in disclosing the presence of explosives could be as low as 30 per cent and would be unlikely to exceed 70 per cent.[3] While the Society correctly maintains that much could be achieved through improving the work procedures and conditions of screening staff, it is equally true to suggest that a new direction is called for in the capacity of detection processes automatically to pinpoint suspicious substances passing through airport terminals and to do so in an efficient manner by which false alarms can be minimised and passengers screened swiftly.

Wilkinson's reference in the above quote to "countries" is highly

[1] P. Wilkinson, *Designing Effective National Aviation Security Systems: The Building Blocks for an Enhanced Global Response*, conference paper (unpublished) presented at ISA / BISA Conference, London, 31 March 1989, p. 5.

[2] House of Commons Committee on Transport (1989), p. 6.

[3] *Airports International*, January 1990, p. 21.

appropriate in discussion of research financing for advanced screening equipment, because of the great expense involved in attaining new standards of detection. Clutterbuck, too, has drawn attention to the increasing need for state involvement in contemporary research and development of new technology:

> "Most of the research is financed by private firms and potential customers are reluctant to place advance orders or provide money until they are confident that the system is going to succeed; the manufacturers will continue research or launch production only if they are confident that they can sell the product. In view of the urgency of the need to find new means of detecting explosives there is a strong case for governments to finance the research and possibly also to provide incentives in the form of guaranteed orders dependent on the system's achieving certain defined levels of performance."[4]

A broad range of publicly funded and supported research and development schemes is now urgently required in order to create a wide range of low cost, high speed security apparatus which will be sufficiently cost-effective in production and operation as to be suited to general introduction. Details of possible joint public/private sector funding mechanisms will be discussed below. Several corporations are actively attempting to develop viable new technology in conjunction with government agencies, because it has become apparent to marketing executives that the evolution of a new terrorist mode of attack has brought with it a potentially huge market for devices intended to counter these dangers. Estimates by analysts Paine-Webber of a market in excess of $1 billion (US) have been made on account of the number of airports and carriers worldwide which might be expected to be equipped with advanced security systems. In the United States alone some 1,400 airports could stand to benefit from successful development of new technology. According to estimates issued by the American Air Transport Association (ATA), US carriers' expenditure on conventional (inadequate) screening equipment in 1988 stood at approximately $500 million (US), indicating the scope for commercial success for any firm able to augment X-ray and metal detection apparatus with a cost-effective new generation of security devices.[5]

The issue of escalating costs in equipping airports with highly advanced, computer-controlled equipment is one which is bound to cause concern with the industry and with aviation users because of the necessary costs involved. Undoubtedly, a high financial price must be paid in order to develop and deploy a new generation of equipment with exciting new detection capacities. On the other hand, it must be noted that the expense involved can be low when taken as a proportion of aviation development costs as a whole or even when compared with certain simple costs.[6] One major high technology manufacturer has estimated that an airport could equip itself with an advanced neutron

[4] Clutterbuck (1990) I, p. 59.

[5] *The Christian Science Monitor*, Thursday 16 February 1989. p. 9.

[6] Wilkinson (1990) IV, pp. 19 - 20.

analysis machine for less than the total costs incurred in handling one serious aviation bomb threat.[7]

6.2. Advanced Security Equipment

6.2.1. Research Problems

It is always difficult to offer an objective assessment of new technologies' qualities and to compare the abilities of each with others and with existing equipment. One reason for this problem is the serious lack of information available to academic researchers. Publicity material and press cuttings provided by responding technology firms (used as a source below, though with great caution) provide incomplete information and occasionally biased views, which must be treated with a degree of healthy scepticism at all times. The following sections on new technologies are intended simply to present the strengths and weaknesses of new security methods.

It should be made clear that no system - however advanced - can provide perfection in preventing or deterring violent attacks against aviation interests. Commentators and producers can be slow to remember this point, sometimes propounding the apparently unbounded virtues of certain new processes or the wholesale failure of others. With the former fault, the over-ambitious success claims from manufacturers and the hasty implementation decisions of aviation authorities cannot be tolerated if they are incapable of being substantiated by referring to test results or common reason. Equally, in the case of the latter fault, there is a risk of overlooking the possibilities of long term advances being made and concentrating instead on current, temporary shortcomings.

6.3. Two Advanced Explosives Detection Systems

In conjunction with the private sector's commercial interests, the public sector of some major aviation states has at least paid lip-service to the needs of aviation security and in a few cases has become fully integrated into the research and development quest. Of particular interest is the long-standing and well-resourced programme conducted by the FAA to investigate with US corporations new high technology approaches to detecting nitrogen-based explosive compounds.[8] Its somewhat reactive history was succinctly described in January 1989 by scientific journalist, M. Mitchell Waldrop:

> "[T]he challenge of explosives detection has been well recognised for nearly two decades now, during which time the FAA's efforts have grown in rough proportion to the perceived magnitude of the threat. In 1975, for example, the FAA was designated as the federal government's lead agency for explosives detection research in the wake of a bombing at La Guardia Airport. And in 1985, the FAA greatly accelerated its efforts when the

[7] Publicity material for SAIC. 1990.

[8] Most explosives contain a high proportion of nitrogen in their chemical composition, making the element an ideal target for screening systems. McGuire (1989), p. 3.

destruction of an Air India flight off the coast of Ireland made it apparent that the threat was escalating rapidly. Starting from about $1 million per year in the early 1980's, funding for the explosives program peaked at $13.5 million in 1987 as the agency went into a prototype demonstration phase for the most promising technologies, and now stands at just over $8 million dollars per year."[9]

6.3.1. Thermal Neutron Activation

Since the 1970s, aviation and defence authorities have been aware of the need to develop automated detection systems with a specific capacity for locating and, if possible, identifying the most elusive plastic explosives in two distinct locations: inanimate objects; and around living tissue. The FAA's active interest in this quest led it to invest its explosives detection budget in the research and development of two independent systems - neutron activation and chemiluminescence. Each of these rely on physical, atomic properties of the component elements of nitrogen-based compounds, which include virtually all industrial and military explosives currently used by aviation terrorists.

The former, and more readily advanced of these techniques, originally named Thermal Neutron Analysis and now known as Thermal Neutron Activation (TNA), employs low energy neutrons to achieve a much better penetration of baggage than can be found with X-rays.[10] In the late 1970's and early 1980's, the FAA's project in this field was conducted by the Westinghouse Corporation. As the scheme advanced, Science Applications International Corporation (SAIC) of Sunnyvale, California, was involved, partly because of its industrial experience in developing the technique to measure sulphur presence in coal samples. In 1985, after the Air India incident of that year had focussed security planners' attention on the urgent need for progress, SAIC was contracted by the FAA to produce prototype test models of TNA security equipment.[11]

By 1988, a plan had been formulated to produce and install five TNA machines in airports for field tests by the FAA in conjunction with US carriers. These machines alone were expected to cost $8.4 million (US) to be financed by the FAA.[12] In the aftermath of the Lockerbie incident, a decision was taken by the FAA's Administrator, Allan McArtor to accelerate the development of the project by six months and to increase the number of field test models to be ordered from five to six, in so doing raising the initial production bill to $10 million (US). In total, at least $60 million (US) and possibly as much as $100 million (US) will have been spent on the entire programme by the

[9] *Science*, 13 January 1989 (reprint).

[10] *Aviation Week and Space Technology*, 3 August 1987, p. 43.

[11] *Science*, 13 January 1989 (reprint); Bozorgmanesh (1990), p. 1.

[12] *The New York Times*, Sunday 25 December 1988 (reprint).

time of its completion.[13] In terms of pricing, initial estimates placed TNA at a figure of $1 million (US) although by 1990 this had fallen to $750,000 (US). SAIC intends eventually to be able to offer the system at $500,000 (US).[14]

The principles underlying the TNA technique are complex and highly scientific, but can be summarised in the following terms. When baggage is placed in the apparatus's exposure chamber, it is surrounded by a field or "cloud" of low energy, thermalised neutrons (generated by a sample of the radioactive isotope, californium-252,[15] and emitted in pulsed fluxes) which "showers" the baggage, resulting in the neutrons colliding with molecules contained in the matter being screened. Some of the neutrons enter the nuclii of the molecules, causing certain of the various chemical elements encountered to react in different and specific ways. Very high energy gamma rays are emitted, varying in character according to the substances' chemical composition. Hence, each chemical element presents its own unique "signature" which can be identified by analysis. Nitrogen exhibits the most energetic of elements' responses to neutron activation and so is an ideal chemical to seek to isolate using this screening process. Other elements are also sought in an attempt to identify explosive compounds more accurately.[16]

After the rays have escaped, a ring of detectors receives them for analysis, so as to determine the atomic content of the materials present in the chamber. With the assistance of a built-in computer used for very advanced data processing, a detailed and accurate comparison is made between the information received and the system's electronic memory of information on known explosives' composition. Capable of being programmed to identify an explosive's type and its mass, the TNA system compares the physical density of a sample with its nitrogen concentration.[17] A key feature of the system is the computer's "learning ability" in that it can progressively store information about sample types as it is increasingly employed. This feature was described by Dr. Hadi Bozorgmanesh, Corporate Vice President of SAIC, in his statement to the President's Commission on Aviation Security and Terrorism:

> "The introduction of artificial intelligence, or AI, is a way of saying that the TNA system that we've developed gets smarter the longer it is on the job. Because of its software, the machine learns and remembers -- over the course of scanning

[13] *International Herald Tribune*, 28 April 1989 (reprint); *Aviation Week and Space Technology*, 2 January 1989, p. 43; J.R. Wilson, "Why a Hint of Red Rings Alarm Bells." *Jane's Airport Review*, June/July 1989, p. 18.

[14] McGuire (1989), p.5; Publicity material for SAIC, 1990.

[15] In newer models, the more reliable and long-lived deuterion-deuterion (DD) isotopes are being used. McGuire (1989), p. 4.

[16] Publicity material for SAIC, 1990.

[17] Wilson (1989), p. 16.

> thousands of bags -- what bags and their contents look like, and what various types of planted explosives look like as well. This contributes to lowering the "false positive" signals even further and allows the experience of one machine to be shared with another TNA machine."[18]

If the bag's signatures do not approximate to those of the memorised explosives, it is deemed to be clear and allowed to continue its passage unstopped. If, on the other hand, a signature corresponds even roughly to any records of suspect compounds in the computer, the bag is diverted for further searches and staff are alerted to the identified risk.

Security operatives need make little judgement concerning the nature of the threat, as rejection is automatic, with television screens displaying information which shows the likelihood of the nitrogen being an explosive component. The system classifies each bag as being either "clear" or "unclear", implying that further investigation should be undertaken to determine whether or not a threat exists.[19] Staff are also told whether the compound is in bulk or in sheet form, to facilitate more informed manual investigation, and, on SAIC's "XENIS" model, can be assisted by the inclusion in the apparatus of X-ray detectors, which are particularly useful for secondary screening of "unclear" baggage, so reducing false alarm rates.[20] Although high contrast, colour imaging of the X-ray picture can be used to illustrate the location of explosives, the machine's ability automatically to reject suspect baggage is, in itself, a more important advance. The use of this technique to relieve operatives of the often onerous responsibility of initiating action against a suspicious object was deliberately decided upon by the FAA as a means of removing dangerous discretionary powers from an activity which need not always rely on them.[21] Automation also permits a reduction in staff numbers over conventional screening modes, though wages costs need not necessarily be lowered as personnel teams require quite highly skilled labour to utilise the apparatus to its fullest potential.[22]

The development of neutrons as a penetrative medium of radiation,[23] while being effective, also guarantees safe screening with no risk of any damaging levels of residual radiation being present in baggage. The system's radiation dosage rate is approximately 100 times lower

[18] Bozorgmanesh (1990), p. 2.

[19] E.E. Murphy (1989), p. 34.

[20] Wilson (1989), p. 16. It has been claimed that the addition of XENIS capabilities has reduced the need for manual inspection by half. *Airports International*, January 1990, p. 18.

[21] *The New York Times*, Sunday 25 December 1988 (reprint).

[22] *Airports International* January 1990, p. 18.

[23] Wilson (1989), p. 17.

than that of currently available X-ray security devices.[24] Although reports were made of TNA leaving gold jewellery and some salted foods very slightly radioactive, it was evident to the US Nuclear Regulatory Commission that no health risk is posed by the system.[25] In addition, no impairment of photographic film or electromagnetic media takes place in the scanning process.[26] Nevertheless, the fact that the new airport technology involves a hitherto unencountered mode of invasive screening has meant that TNA systems have yet to be given official US federal clearance to screen hand baggage.[27] SAIC plans to produce a certified carry-on baggage screening TNA machine of about the same size as conventional X-ray systems, though priced at between $400,000 and $600,000 (US).[28]

Another problem identified by Wilson concerns the inability of TNA to be used on living tissue (despite the very low levels of radiation involved). Presenting an interesting variation on the theme of unwitting dupe carriers, he has suggested that terrorists could surgically implant bombs into living animals which, as live cargo, would not be screened.[29] Although an unlikely scenario, Wilson's observation demonstrates the need to view any piece of new technology as a possible additional tool, rather than a complete cure, for all security screening problems.

SAIC claims that optimum screening rates of around 600 pieces of hold baggage per hour can be achieved, which, if accurate, would make TNA roughly half as efficient as existing metal detection systems.[30] It would also rank behind optimum X-ray rates, which can easily be as high as 900 pieces per hour.[31] This performance figure is planned by SAIC and may be achieved in time,[32] to the advantage of the industry which in the expanding market of the future will inevitably place greater emphasis on efficient facilitation of baggage, as well as passengers, through security points.

[24] Bozorgmanesh (1990), p. 9.

[25] *USA Today*, 30 June 1989 (photocopy).

[26] Publicity material for SAIC, 1990.

[27] E.E. Murphy (1989), p. 35.

[28] Wilson (1989), p. 17.

[29] *Ibid.*

[30] SAIC's claim has been described by one expert as "optimistic". McGuire (1989), p. 4.

[31] *Aviation Week and Space Technology*, 16 January 1989 (reprint).

[32] Wilson (1989), p. 17.

Benefits of the system include TNA's ability to identify the nitrosignatures of elements contained in drugs of abuse and its possible future applicability to screening freight as well as smaller baggage.[33] One practical drawback of the technique concerns its use of an expensive, but wasting neutron source. As the californium - 252 isotopes in question would require occasional renewal, at a cost of up to $15,000 (US) every three years,[34] it has been suggested that research be intensified to develop an alternative, non-wasting neutron producer which would operate on electronic, rather than radioactive, principles.[35]

In addition to US research into TNA technology, other states, most notably France through its Direction Générale de l'Aviation Civile (DGAC) and its atomic energy commission (CEA), are engaged in advanced work on the technique. The French Société d'Études et Réalisations Nucléaires (SODERN) has been actively involved in the programme since 1985 and is developing an integrated approach to secondary test methods for baggage, which causes its TNA system to issue an alarm.[36]

Positive testing of a piece of baggage in SODERN's EDEN (Equipment de Détection d'Explosifs par Neutrons) apparatus results in the article being transferred to a second chamber for a more rigorous backup test by Fast Neutron Activation, discussed below, to confirm the initial finding.[37] In this way greater certainty could be achieved, by reducing reliance upon manual searches and, hopefully, by maintaining efficiency in detection while minimising false positives. It is the intention of SODERN to achieve a failure rate of 0.01 per cent and a false alarm rate of 0.5 per cent by means of its backup checks.[38] If it were possible to maintain this performance in its operational environment, it would compare very favourably with SAIC's failure rate of 5 per cent and its false positive result of 4 per cent over a sample of 40,000 pieces of baggage with its prototype model.[39]

Another benefit claimed over US competition is the extended tube life of the neutron generator employed by SODERN, which can produce as many as 100 billion neutrons per second.[40] An impressive processing rate of 700 bags per hour has been predicted for EDEN by its developers,

[33] *Flight International*, 6 May 1989, p. 13.

[34] McGuire (1989), p. 6.

[35] Vincent (1989), p. 34.

[36] *Airport Support*, June 1989 (reprint).

[37] *Flight International*, 6 May 1989, p. 13; *Jane's Airport Review*, February/March 1989, p. 3; Norris (1989), p. 693.

[38] *Jane's Airport Review*, February/March 1989, p. 3.

[39] *The New York Times*, Sunday 25 December, 1988 (reprint); *Jane's Airport Review*, February/March 1989, p. 3.

[40] *Airport Support*, June 1989 (reprint); *International Security Review*, January/February 1990, p. 7.

with that rate doubling through the introduction of twin conveyor belts. While running costs will be low, early estimates of a $1.6 million (US) price tag would place it well above even SAIC's TNA price range.[41] It is planned, nevertheless, to have eleven French airports using EDEN by the end of 1993.[42]

In the United Kingdom, researchers at the Atomic Energy Authority's base at Harwell have also been developing prototype neutron analysis technology, although no short term operational benefits are expected from this project.[43] Ultimately, however, it is hoped that neutron bombardment equipment may be marketed at a much lower price than SAIC's product, offering higher screening performance levels.[44] In 1989 it was reported that the prototype British technology was unable to offer adequately low false alarm rates, with alarms occasionally being triggered by such common substances as wool, leather and scents. Sadly, funding problems have inhibited explosives detection research to proceed at a reasonable rate in the UK. In the summer of 1989, the Ministry of Defence invited tendering applications for work on different systems of explosives detection. By the year's end, however, the plan had been abandoned due, it seems, to a lack of funds.[45] This indictment of UK public policy on research and development is characteristic of the British Government's half-hearted and vascilating approach to security technology and is an important factor in explaining why those US corporations which benefit from the steady commitment of the FAA are leading their British counterparts in the race to produce workable explosives detection equipment for a lucrative market.[46]

At present, the latest prototype TNA models suffer from various practical inadequacies which must be overcome if demand for technology is properly to be satisfied. For example, in addition to the comparatively high costs of SAIC's neutron activation machines, which retail at around $750,000 (US),[47] much extra expense can be incurred in housing the units, perhaps in a crowded airport in which free space is difficult to liberate. When, on 14 August 1989, TWA took possession of its test model at its international terminal in John F. Kennedy airport, New York, a separate, specially constructed building measuring 19 feet x 40 feet required to be used for its

[41] *Jane's Airport Review*, February/March 1989, p. 3.

[42] *Flight International*, 6 May 1989, p. 13.

[43] *Ibid.*, p. 12.

[44] *The Times*, Thursday 22 March 1990, p. 13.

[45] *New Scientist*, 7 January 1989, p. 23.

[46] Note that the government of the Federal Republic of Germany decided in the summer of 1990 that it would engage in new and comprehensive joint ventures with its private sector to develop neutron detection technology. Information received from West German aviation security expert, Paris, France, June 1990.

[47] Publicity material for SAIC, 1990.

housing, costing a further $125,000 (US).[48] SAIC believes that these machines can be very cost-effective because, it claims, they can clear a workload of three million bags per year. Based on this figure, a TNA unit, working at the limits of its potential, could be paid for within a year at a rate of $0.34 (US) per bag.[49]

In prototype field tests conducted between June 1987 and March 1988 by the FAA at Los Angeles and San Francisco airports, SAIC's system exhibited a 95 per cent success rate over the 40,000 bag sample, which could and should be improved with further development.[50] If production models were to be installed with this present success rate, the system could be expected to fail to detect approximately one in twenty of devices with the sophistication of the FAA models used. If it is assumed that in future terrorist bombs might be less prone to detection than those currently used by the FAA (by, for example, using smaller amounts of explosives) this ratio would require to be changed to one in fewer than twenty.

Early production models of TNA units are unreliable in their attempts to detect less than 2.5 pounds of plastic explosives. One reason for the failure of TNA to detect such small packages of explosives can be traced back to the early 1980s when the FAA specifications which were being used by developers of explosives detection systems (EDSs) called for it to be able to detect bombs which were of a sufficient size to threaten the flight of an airliner. It seems likely that the 2.5 pounds minimum feasible weight which had been used by the FAA as a benchmark for research was grossly inaccurate and that a much lower level, perhaps of less than 11 ounces of Semtex, would have been a more appropriate figure to specify.[51]

If this suspicion were to be confirmed, the FAA's error would constitute an elementary, though major administrative failing, because properly assessed engineering specifications for a project of this nature are crucial to its long term success. Although absolute certainty on the critical amount of explosives could not be stated with confidence, forensic evidence of small, yet effective, plastic explosives devices has existed since the early 1980s. Had specifications been continually monitored and adjusted as required, the FAA's embarrassing mistake in promoting a partially unworkable machine might have been avoided. Instead, as Professor Lee Grodzins of the Massachusetts Institute of Technology has pointed out:

> "We don't know whether the present TNA machine would meet the requirements we would set down now."[52]

[48] *Aviation Week and Space Technology*, 20 February 1989, p. 118; McGuire (1989), p. 5; E.E. Murphy (1989), p. 34; Publicity material for SAIC, 1990.

[49] Bozorgmanesh (1990), p. 1; Publicity material for SAIC, 1990.

[50] *The New York Times*, Sunday 25 December 1988 (reprint).

[51] Vincent (1989), p. 34.

[52] E.E. Murphy (1989), p. 34.

In response to this, SAIC has argued that current TNA technology can be expected to detect:

> "95 percent of bombs of the smallest size believed to have been used in the Pan Am flight 103 incident."[53]

Advocates of the system have also noted that calibration of TNA machines is feasible to reduce the threshold below the 2.5 pound level, though with the concomitant effect of increasing false alarm rates.[54] Still, it is perplexing to consider that no reputable civil aviation authority in the world can know with certainty how much explosives are needed for successful in-flight sabotage (simply because none has ever tried to blow up a jet airliner) but that certain terrorist groups have access to this critically important figure, as a result of their practical experience of evading security systems and sabotaging aircraft with their tiny, yet lethal packages. Note also that since the democratisation of Czechoslovakia in 1989, it has become apparent that tests using Semtex plastic explosives were carried out on civilian airliner fuselages by the previous regime, most likely with the intention of passing the test results to sponsored terrorist organisations.[55]

As TNA screening normally permeates all matter within the chamber, it is usually immaterial whether or not explosives are packed, concealed or even hermetically sealed. This does not, however, preclude the possibility of TNA apparatus being foiled by ingenious terrorists. John Flinn, an explosives detection consultant of Stafford, Virginia, USA, has claimed that a bomb could evade detection if its explosives were to be encased in a cadmium wrapper, which would effectively conceal its contents from TNA's screening process.[56] Such an allegation has been countered by SAIC's Dr Patrick M Shea, who has suggested that as shielding materials are rare in passenger baggage, it is possible to incorporate a feature designed to identify them.[57]

As mentioned above, first generation SAIC TNA machines have an unacceptably high false alarm rate of 4 per cent. If this percentage were to be applied to a wide-bodied jet's baggage payload of 700 bags in the hold alone, the rate would result in 28 bags needing some additional means of examination which in turn could require perhaps more than an extra hour of a searcher's time.[58] In December 1989 it

[53] Publicity material for SAIC, 1990.

[54] *Airports International*, January 1990, p. 18.

[55] *ITV, TV Eye*, Thursday 28 June 1990, 9 pm.

[56] *The Christian Science Monitor*, Thursday 16 February 1989, p. 9. Similar claims have been made in connection with the element boron. McGuire (1989), p. 6.

[57] Wilson (1989), p. 17.

[58] *USA Today*, 30 June 1989 (reprint); ATA baggage figure quoted in E.E. Murphy (1989), p. 34.

was reported by Wilkinson that SAIC's scientists had reduced TNA's false alarm rate to only 2 per cent, although with this lower figure, inefficiencies could still prove problematic for screening staff working to a tight schedule.[59] In defence of TNA, it is necessary to point out that a false alarm rate of 2 per cent is lower than would be expected to be found with conventional screening devices used with passengers and their hand baggage.

Nevertheless, in the case of hold baggage, a low false alarm rate is desirable because of the greater length of time required to search bulky items featuring a large surface area and many contents. This is most likely to be achieved in the short term by uniting TNA technology with other systems, such as advanced X-ray.[60] Ultimately, it may prove impossible to reduce false positives from screening devices below certain critical levels, in which case this fact would need to be recognised. This could result in requiring other means of screening to be developed or else in the scheduling of flights and timings of passenger searches to be adapted accordingly.

Until greater technical sophistication produces a machine which can be much more certain in its differentiation between explosives and other nitrogen-based substances such as wool, silk, nylon and leather, adjustments in sensitivity may also be needed to reduce the number of incorrect positives.[61] If, however, calibration of the apparatus were to be altered to phase out the false alarms almost entirely,[62] then, as with conventional screening technology (described above) sensitivity to smaller samples of explosives would be reduced, so increasing susceptibility to screening failure.

Equally, of course, a desire to isolate a bomb of the type and size found in the 1988 police raids in West Germany could necessitate a crucial loss of efficiency, resulting in false positives increasing in frequency and, paradoxically, returning screening staff to their traditional and uncertain role of physical searchers. This scenario would entail additional dangers of carelessness, apathy and mistrust of the technology by its overworked operating staff.[63] In respect of TNA's inevitable trade-off between sensitivity and efficiency, Grodzins has made the following assertion which, if verified, would have severe consequences for the prospects of TNA's practical success:

> "The percentage of uncleared bags might rise to 25 percent or higher if the machine is set to pick up a bomb like the Pan Am 103 bomb."[64]

[59] Wilkinson (1989) IV, p.19. See also Nelms (1989), p. 690.

[60] *The Times*, Thursday 22 March 1990, p. 13.

[61] McGuire (1989), p. 6.

[62] Vincent (1989), p. 33.

[63] *Ibid.*

[64] E.E. Murphy (1989), p. 34.

Once again, it is important to remember that a success rate of approximately 95 per cent can be achieved without needing to adjust calibration at all. Hence, a very high quality of screening - higher than could be expected from X-ray and metal detection equipment in their search even for metallic compounds - can be achieved for all but the smallest devices.[65] With the difficult category of bombs containing a low level of high explosives, however, problems of calibration remain. A responsible balance between the goals of minimising false positives and maximising detection powers is currently difficult to find, because of the threat from lethal bombs, the size of which is beneath the FAA's outdated 2.5 pound mass specification. The only means by which this crisis of technology can be resolved to the satisfaction of the aviation industry is for further research and development to take place, so as to push the frontiers of technology outwards and permit production of TNA apparatus of higher sensitivity and efficiency.

Even assuming that SAIC's screening rate estimates of six seconds per piece of baggage were to be proven accurate in commercial operation and that no extra examination was required of any screened article, further difficulties in the operation of the system would need consideration before widespread implementation could be considered. For example, practical problems of congestion would still require to be addressed. If governments or aviation authorities were to enforce a requirement that carriers screen all hold contents then, as Vincent has observed, TNA would be far too slow for the apparently simple task:

> "The TNA detectors are inefficient because a single unit will still be needed just to service one B-747 at its current processing rate. The first TNAs can examine an article every six seconds under ideal conditions. TNA examination of a 350 seat B-747, with two checked bags for each passenger will require a minimum of 70 minutes under ideal conditions. Add to this the other mass of parcel, cargo, etc., carried on each commercial airliner and you arrive at an almost hopeless situation."[66]

In the period from 18 September 1989 to 23 January 1990, 37,183 items of baggage were run through TWA's operational machine, with approximately 490 of the 7,558 bags which contained explosives simulant failing to be detected. This resulted in a detection probability of 93.51 per cent - or a failure probability in practice of 6.49 per cent.

Bozorgmanesh has claimed that SAIC's TNA technology can operate without adversely affecting throughput rates. SAIC recommends a phased introduction of TNA machines over several years, so as to enable logistical adjustments to be made in baggage handling practices

[65] Publicity material for SAIC, 1990.

[66] Vincent (1989), p. 33. It has been reported that TWA estimated that effective, economic use of the technology would require the carrier to instal as many as 35 TNA machines in John F. Kennedy airport alone. McGuire (1989), p. 4.

on a gradual basis.[67] In the case of the recently installed apparatus, the company reported that TWA's machine has caused no delays to the scheduled flights or passengers.[68] This statement should, however, be viewed in the context of the TWA model's operations thus far. In the first 128 days of its employment, the apparatus was used to screen an average of only 290.49 items per day, which would equate with an annual rate of 106,030 items per year - only one twenty-eighth of its potential capacity. While this indication of TNA's high success rate in practice is to be welcomed, a truer indication of the device's usefulness for screening hold baggage in tight schedules will only be guaged once it has been subjected to the same type of operating pressures as X-ray and metal detection processes currently undergo.

Another problem which might limit the abilities of TNA and any other security equipment which is dependent upon a store of electronically memorised explosive characteristics is the risk posed by the advances of arms technology. For as long as terrorists continue to employ familiar nitro-group compounds as the key ingredient of their bombs, such detection mechanisms will have practical utility. If and when new, possibly more potent, substances are created which do not present recognisable nitrogen signatures, TNA machines will require to be adapted to accommodate the new threat, or else will become obsolescent. More ominously, if terrorists are ever able to rely on high explosives which do not contain nitrogen at all, TNA's detection powers would risk being superseded entirely by the evolution of explosives technology.

Measuring six feet x eight feet x thirteen feet and weighing around 18,000 pounds, currently available neutron activation machines for hold baggage screening purposes would not be physically suited to multiple employment at many airports.[69] These specifications compare unfavourably with those of standard X-ray screening units. For example, Astrophysics's System Seven device, designed for the passage of very large items, including crates, measures approximately four feet x six feet x fourteen-and-a-half feet, and weighs 2,948 pounds.[70] It is predicted that before long, neutron bombardment machines will be produced which will be only slightly larger than conventional airport X-ray units, while special efforts are being made to develop a compact model for use with hand baggage (plus a larger unit for cargo scanning).[71] Irrespective of size, however, location problems may still require to be addressed by airports reaching the limits of their capacity, because if TNA is to be fully employed to the best of its potential and used on hold baggage, sites will need to be made available for security staff and passengers together to open and

[67]Bozorgmanesh (1990), pp. 3 - 4; Publicity material for SAIC, 1990.

[68]*Ibid.*

[69]Publicity material for SAIC, 1990; *USA Today*, 30 June 1989 (reprint).

[70]Publicity material for Astrophysics, 1990.

[71]Publicity material for SAIC, 1990.

search suspect cases and packages. Moreover, as new technology stands to supplement rather than to replace existing techniques, floor space will still require to be retained for accommodating other types of security screening, if only in the form of existing hand baggage X-ray and metal detection modes.

One possible screening compromise which might overcome critical foyer floorspace problems could be to use TNA for specific purposes in less important areas, such as for screening cargo, unaccompanied baggage or objects which have failed reconciliation tests.[72] Alternatively, the ATA has suggested that TNA could be used as a security tool to screen the baggage of passengers rated as being of a high risk in profiling tests.[73] On the other hand, some such restricted uses of TNA might depend too greatly upon the existence of watertight back-up procedures (including first class profiling activities) and would, in any case, undermine the purpose of introducing the technology, as they would leave the majority of passengers' hold baggage insufficiently screened in the absence of other techniques.

An important factor in advocating the use of efficient forms of TNA screening on a high proportion of baggage in future is its possible deterrent effect. If employed merely as a hidden extra for a small proportion of articles that effect would be largely lost. Incorporated instead in a high profile screening role, the technique could serve to persuade some potential terrorists to target less well prepared sites or else to discourage attack. If new technologies, such as TNA are to enjoy significantly more than a redistributive effect, pushing terrorists towards softer targets, it is clear that they should first be made fully workable and then installed by a wide range of airports and carriers. Public and international encouragement of this by offering assistance, subsidies and enducements (such as "seed money") to the industry would be a useful, if not necessary, option for states to consider.

The US Administration's faith in TNA was demonstrated on 29 December 1988, within a week of the Lockerbie disaster, when it issued a prominent announcement to the world's news media that TNA would be deployed at its airports.[74] Then, on 4 April 1989, the day after President George Bush had met with family members of the victims of Pan Am Flight 103, a further publicity-conscious declaration was made.[75] Transportation Secretary Skinner announced that US airlines would be made to introduce TNA technology at the most important airports at home and abroad, "at the earliest feasible date", once the machines were in commercial production.

On 5 August this policy was concretised, at Congressional request, into an official FAA final rule, requiring US airlines to introduce means of explosive detection within a five year period. A rule was

[72]House of Commons Committee on Transport (1989), p. 6.

[73]E.E. Murphy (1989), p. 35.

[74]Vincent (1989), p. 32.

[75]*The Economist*, 8 April 1989, p. 47.

also published on 5 October requiring approximately 50 FAA endorsed EDS systems to be in place at certain airports by 1990 and 150 by the end of 1991 with 100 per cent inspection of hold baggage to be taking place by 1999.[76] In effect, this ruling currently requires the employment of TNA technology, as it remains the only means of automatic explosives detection deemed by the FAA to be sufficiently quick, safe and reliable.[77] The measure is intended to be implemented first with international flights' hold baggage at 40 high risk airports worldwide (15 in the USA and 25 abroad) - a purpose which Vincent has suggested is entirely inappropriate for the processing rates of available technology (see above). Ambitious FAA predictions suggest that by the end of 1991 about 150 TNA systems could be operating. It had earlier been suggested that as many as one hundred of the machines would be ordered by the FAA.[78]

These decisions were taken despite the many totally valid doubts which lingered in the minds of security experts as to the true cost-effectiveness and operational capacities of the first TNA test models. Even an FAA consultant, testifying before a US Congressional Committee, aired doubts as to the adequacy of TNA testing.[79] In the joint submission of the Airport Operators Council International and the American Association of Airport Executives to the President's Commission in 1989, the bodies stated their concern that there were significant problems with:

> " ... the manner in which the industry has had to accelerate the implementation of untried hardware and unproven procedures and methodologies."[80]

In response to such criticism, the FAA reacted swiftly, giving the impression that they viewed the urgent need for introduction of new technology as a key priority. In the words of Lyle Malotky, who manages the FAA's aviation security technical branch:

> "The fundamental issue is that the technology works, and that the decision was made that something was better than nothing."[81]

This attitude was mirrored by that of Skinner:

> "Ten years from now I'm hopeful the technology will have evolved to the point where it's absolutely foolproof. Now it's the best

[76] Flight Safety Foundation (1989), p. 12; *International Security Review*, January/February 1990, p. 8; Murphy (1989), p. 34.

[77] Bozorgmanesh (1990), p. 2; Flight Safety Foundation (1989), p. 12.

[78] *Flight International*, 15 April 1989, p. 10.

[79] *International Security Review*, January/February 1990, p. 8.

[80] *Airports International*, January 1990, p. 25.

[81] E.E. Murphy (1989), p. 36.

technology available".[82]

In stark contrast to these views, the President's Commission was adamant in its Report that TNA technology was inadequate for operational use and required considerable refining. Describing a test carried out on the TWA machine in New York's Kennedy airport, in which three amounts of Semtex were used (one equal to the FAA's unrealistically high specification, another at a more reasonable 60 per cent of that mass and another at a taxing, but feasible, 30 per cent), the Commission noted that performance was poor:

> "Although calibrated to detect the EDS specification set out by the FAA, the TNA machine failed to detect the explosive in two out of ten passes; it failed to detect the amount equal to 60 percent of the EDS specification seven out of eight passes; and it failed to detect 30 percent of the EDS specification on any of the eight passes."[83]

The conclusion of the Commission was that deployment of the current TNA technology would "mislead the flying public by offering a false sense of protection." Rather than urge immediate adoption, the FAA should, it claimed, continue to refine techniques.[84] Grodzins also believes with justification that instead of jumping headlong into a long term commitment to the technology which it helped to produce but which has not yet realised its full developmental potential, the FAA would be better advised to assess the in-service strengths and weaknesses of the machinery in a limited number of test sites over at least a one year period. After tests had been completed, results would probably help planners to improve upon existing technology and to produce cheaper, more advanced equipment, more suitable for the practical airport environment than that which currently exists and which, if forced upon the industry, would needlessly consume airports' and carriers' limited security budgets but would provide a standard of security which would fall far short of being unusually excellent.[85] AOCI has also petitioned the US Congress, the Department of State and the Department of Transportation, urging that further developmental work be undertaken before implementation takes place:

> "The agency should devote the resources necessary to bring these infant technologies to rapid maturity - and then use them."[86]

Although the US Administration is to be commended for taking the initiative to commence research work on explosives detection and for investing millions of dollars in it while other governments remained inactive, it can be criticised for seeking to force the industry to

[82] *USA Today*. 30 June 1989 (photocopy).

[83] President's Commission (1990), p. 65.

[84] *Ibid.*, p. 66.

[85] E.E. Murphy (1989), pp. 35 - 36.

[86] Nelms (1989), p. 692.

invest in machinery which is, as yet, unable to provide an adequately high level of detection performance.[87] It would be unfortunate if the long term well-being of security systems were to be jeopardised by misplaced faith in a technique which had not fully demonstrated its maturity. More considered scepticism and less unfounded certainty about the state of TNA's advancement might eventually save political embarrassment for the FAA, prevent terrorist tragedy for passengers and avoid economic hardship for the industry.

The House of Commons Select Committee on Transport was sufficiently wise to realise that, in the broad context of security activity, TNA still requires to be treated with a degree of caution.[88] This caution was matched by that of the British Department of Transport and BAA which together opted to install TNA at Gatwick airport for a twelve month test period. The FAA-sponsored machine commenced operation in mid-1990, being used in a limited capacity on the hold baggage of passengers of all carriers diverted by facilitation staff at check-in desks for extraordinary screening measures.[89] Only after the test period is complete and results are assessed might a decision on the technology's role in the UK's international airports be taken.[90] It has been reported that other states are even more reluctant than the UK to introduce TNA technology in the short term.[91]

Although the first six machines ordered by the FAA are planned to be donated to the airlines carrying out the initial tests, thereafter responsibility for purchasing TNA will fall to required carriers, with the bill for the new devices ultimately being met by profit reduction or, more likely, by fare increases.[92] The expense of the proposed standard's early implementation, combined with doubt about TNA's effectiveness, led to unwillingness within the industry to comply with the ruling and precipitated calls for federal "seed money" to be made available for carriers to finance at least the introduction of the first machines. This would mirror the funding which was provided in the early 1970s for airlines to install the first operational metal detection equipment.[93] In addition, US airports might be entitled to grants under the federal Airport Improvement Program to assist with the industry's attempts to conform with the imposed requirements.

[87] It has been estimated that the eventual costs to the industry of implementing the FAA's EDS programme could be as much as $4.5 billion (US). *International Security Review*. January/February 1990, p. 8.

[88] See quote at start of Chapter.

[89] Experience of current writer, October 1990.

[90] *The Times*. Thursday 22 March 1990, p. 13.

[91] McGuire (1989), p. 1.

[92] *Science*. 13 January 1989 (reprint).

[93] O'Ballance (1989) I, p. 19: *Aviation Week and Space Technology*. 20 February 1989, p. 118.

Such awards would not, however, be made to foreign authorities.[94]

Government resources might be freed for this purpose if wide-ranging and dedicated industry lobbying were to be imposed by manufacturers, carriers and airports. As passengers become progressively more aware of the world's security crisis, with the occurrence of more terrorist atrocities against aviation, and as the potential strengths of adequately advanced TNA equipment are publicised, it is possible that pressure for the technique's implementation from the travelling public might also add a valuable impetus to such campaigning.

By the end of 1989, the experimental installation of the first six operational TNA machines had been planned by the FAA in conjunction with the six US airlines flying international flights and with airports in a variety of states,[95] but only one was actually working, having been introduced by TWA to New York's John F. Kennedy airport on 18 September 1989. By February 1990 a second model had been delivered to Miami International, but was not yet operational, while projected shipping dates of no later than May 1990 were being quoted for machines destined for Gatwick, Washington (Dulles), Frankfurt and one other site.[96] The initial aim to equip forty high risk airports was placed under pressure as a result of this administrative difficulty. It seems that for many airports the difficulty of freeing necessarily large amounts of valuable floor space and the upheaval entailed in siting the TNA machinery in a specially constructed room, delayed plans or discouraged them from cooperating with the FAA in its ambitious proposals. This further illustrates the inflexibility of an industry geared to maximising profit and either unable or unwilling to adapt to face changing security demands.

There is little doubt that the development of neutron bombardment technology has presented the aviation security community with new hope that detection capacities may soon be raised at airports of the rich, developed world. The shortcomings of the systems should be able to be overcome with further research, making TNA and its competitors worthwhile additions to existing airport technology. With improvements in screening efficiency and a decrease in false alarm rates, it may prove feasible and economically wise to use neutron bombardment techniques on pallets of baggage, rather than on individual items, as the rarity of explosives in bags might not merit the possibly needless waste of single screening. Also, once commercial production is underway, economies of scale should make the technology more attractive to airport authorities and carriers.

6.3.2. Chemiluminescence Detection

The other explosives system investigated by FAA-funded research was popularly known as vapour (or particulant) detection but could more accurately be termed chemiluminescence detection. This technique

[94] *Airport Support*, June 1989 (reprint).

[95] *Flight International*, 6 May 1989, p. 12.

[96] Bozorgmanesh (1990), pp. 2 - 3. By September 1990, the systems at Miami and Gatwick were operational.

interested US authorities because, unlike TNA's active and invasive approach to screening via radiative means, it relied on collection and analysis of atmospheric samples. This distinction is significant because chemiluminescence's passive, non-invasive methods were developed with a view to achieving the safe and effective screening of persons and other animal life in addition to the inspection of inanimate articles.

While it has been noted above that the most dangerous and potent of explosives have a very low vapour pressure and so cannot be detected even by the trained olfactory processes of dogs and gerbils, scientists have long recognised that machinery might be developed with the requisite powers, as a more reliable alternative. In conjunction with the US State Department's Office for Counter-Terrorism, which sought detection devices which might screen persons and vehicles entering US embassies and consular premises abroad, the FAA engaged the services of a private corporation.

Thermedics, Inc. of Woburn, Massachusetts (a subsidiary of Thermo Electron Corporation) was contracted in the mid-1980s to develop workable detection systems partly because of its record of researching into medical techniques for quantifying amounts of nitroglycerin in human blood. The company believed correctly that adaptation of its medical technology might also provide useful security screening techniques.[97]

The system developed by Thermedics employs the physical characteristic of "chemiluminescence". The method is based on the property of molecules to emit light waves during certain chemical reactions.[98] When adapted as an explosives screening technique, it results in nitrogen components in the substance fluorescing at detectable and recognisable wavelengths when exposed to ozone (O_3) contained within the system's analysis unit.[99] The development programme, which involved at least $6 million (US) of federal funding, was accelerated with the parallel TNA project immediately after the Lockerbie incident, which added urgency to its research schedule.[100]

As with TNA techniques, the process is used to isolate and identify explosive, nitro-group signatures. Unlike TNA, however, vapour detection identifies entire molecular structures, rather than simply a nitrogen component within explosive compounds.[101] The technique developed by Thermedics for its SecurScan equipment is classified by

[97] *The Boston Globe*, 19 October 1988 (reprint); *The International Herald Tribune*, Wednesday 23 July 1986 (reprint).

[98] *Science*, 13 January 1989 (reprint).

[99] Wilkinson (1989) IV, p. 19; *The Wall Street Journal*, Tuesday 1 April 1986 (reprint); R. Jackson and E.E.A. Bromberg, *Development of a Portable Explosives Detection System* unpublished, undated article, p. 14.

[100] *The Boston Herald*, Friday 30 December 1988 (reprint).

[101] *Airport Support*, June 1989 (reprint).

both the FAA and FBI, however some details of its operation are known.[102] Warm jets of air are gently blown for an approximate period of five seconds around the subject being screened in a six feet x eight feet booth. This encourages vapours to be released from any explosives present, which are then sucked into an analysis unit where a catalyst breaks down trace amounts of the sample for six different chemical tests to be made, each being controlled by computer.

If the test result is found to correspond with an explosive type known to the system's internal computer bank, a signal is issued by the system, although the strength of the signal does not necessarily imply any correlating strength of explosives.[103] As the particular chemiluminescent signature being sought is common to the TNT, dynamite and plastic explosives groups, the SecurScan technique can be used to identify automatically all major explosive types.[104] Greater efficiency can be achieved by incorporating a metal detection archway into the sniffing unit.[105] As with TNA, human intervention in the process is only required when the screening equipment issues an alarm.[106]

Ideally, vapour detection techniques should be applied to situations in which items to be screened are of a low volume and closed, to enable vapours to accumulate within.[107] A notable advantage of chemiluminescence over TNA techniques is that the mass of explosives being screened is not a significant factor in determining the technique's success. As noted by Rudy Jackson (of the US State Department's Diplomatic Securities Division) and Edward E.A. Bromberg (of Thermedics):

> "Assuming that enough explosive is present, a realistic scenario, to reach equilibrium, the vapor pressure is not affected by the amount of explosive present. The rate at which equilibrium is reached is a function of surface area, and other secondary effects. Thus, from a purely vapor pressure point of view, a 0.1 kilogram explosive device and a 10 kilogram explosive device, of the same explosive, would have equal probability of being found."[108]

The sophistication of the equipment's "sniffing" capacity is shown in its manufacturer's claim that it can detect as little as one part of

[102] Jackson and Bromberg, p. 2.

[103] *Ibid.*, p. 14.

[104] *The International Herald Tribune*, Wednesday 23 July 1986 (reprint).

[105] Wilkinson (1989) IV, p. 19.

[106] *Time*, January 1988 (reprint); *Aviation Week and Space Technology*, 16 January 1989 (reprint).

[107] W.A. Crenshaw (1987), p. 95.

[108] Jackson and Bromberg, pp. 4 - 6.

TNT or plastic explosives vapours in 100 million million parts of other gases. This level of sensitivity would detect not only the presence of explosives in block, powder and sheet forms, but also the merest residual traces of them on the person of anyone who had handled detectable substances even several days previously.[109] Although few individuals have cause to come in contact with explosives, such sensitivity could, nevertheless, prove problematic in registering what would amount to false positive readings for passengers who work, for example, in certain industrial, engineering, security or military settings. On the other hand, its inventor, Dr David Fine, maintains that a major attraction of the system is its sensitivity, which allows it to detect bombs more than fifty feet away from it, with loaded revolvers possibly being found at a distance of fifteen feet.[110]

As has been demonstrated above, a screening device's sensitivity alone is no adequate gauge of its overall efficiency. In addition, high selectivity is vital, in order that the system does not register time-consuming false positives. In the Thermedics research tests, various vaporous compounds which display non-explosive signatures, similar to those of explosive nitro-group substances, were passed through the apparatus in isolation and in the presence of explosives vapours. This was done so as to determine the susceptibility of chemiluminscence techniques to false alarms from innocent compounds and to discover whether or not those compounds might confuse the screening system or reduce its capacity to detect explosives. Although precise details of the test conditions and results remain classified, it seems that a broad range of compounds including the nitro-musks (found in perfumes and with the same vapour patterns as plastic explosives) did not trigger alarms or reduce performance.[111]

October 1988 saw a prototype Thermedics detection booth being installed at the USAir terminal at Boston's Logan Airport for FAA field tests to take place. During the five days of testing, 2,000 passengers were screened by the $235,000 (US) unit with all fifty test samples used being identified correctly and with only one false alarm being recorded.[112] Unlike TNA and X-ray techniques, vapour detection was demonstrated to be safe and effective against both baggage and humans, making it a truly multifunctional approach to security which could offer both versatility and cost-effectiveness to airports with security budgets which could not permit investment to be made in more expensive technology.

In addition to the SecurScan booth technique, Thermedics has developed a portable, 300-pound vapour detector, known as EGIS, which operates according to the same principles as its larger equivalent but which costs only $135,000 (US) per unit. US State Department funding was received for this development project, because it seemed to provide a

[109] *The Daily Telegraph*, Thursday 29 December 1988 (reprint).

[110] *The Wall Street Journal*, Tuesday 1 April 1986 (reprint).

[111] Jackson and Bromberg, pp. 15 - 16.

[112] *The New York Times*, Sunday 25 December 1988 (reprint); *Time*, January 1989 (reprint).

method, being sought by the Department in the early-to-mid-1980s, of screening vehicles for explosives in order to protect US embassies from the genuine threat of car and truck bombs. In July 1986, the first prototype EGIS detectors were delivered to the State Department.[113]

A major advantage of EGIS is its compact dimensions which, Thermedics has claimed, would make it ideally suited to installation at airline check-in desks for baggage screening prior to dispatch. As early as April 1989, the firm told the British Home Office and BAA that it could equip all major British airports in this way within eighteen months.[114] According to EGIS publicity material, the portable unit's analysis time can be as low as fifteen seconds, with an upper limit of twenty seconds per sample. It should be noted in passing that this figure is much higher than most metal detection, X-ray and neutron analysis systems. Unless employed in a novel way (considered below) this fact would pose potentially catastrophic delay and throughput difficulties for operators.

In order to promote efficiency, Thermedics has allowed for more than one sampling unit to operate with each analysis unit, should this facility be required. As with its larger counterpart, no operator interpretation of test results is required as a clear indication of the screened object's security status is conveyed automatically, in terms of both explosive type and relative quantity. Another benefit accrues from EGIS requiring little maintenance, with automatic self-monitoring of performance being provided. Additionally, the system's only consumable is water.[115]

The technique of chemiluminescence has also been adapted for the US Customs Service so that sniffing can take place to detect drugs of abuse.[116] Eventually, vapour detection might also be employed in a conveyorised method of baggage screening.[117]

The classified nature of the technique makes difficult any reasoned analysis and fair comparison with others. An instance of this difficulty is the inability to know what sizes and types of explosives were used in the field tests and what explosive mass specifications were provided by the state backers of the project. If the technique genuinely does not rely on the mass of the screened explosive above a very low trace level, then it would appear that chemiluminescence offers a workable alternative to existing methods. Equally, however, test results certainly indicate that detection rates are not unable to be improved if extra time and effort are spent in the screening

[113] Jackson and Bromberg, p. 7.

[114] *The Daily Telegraph*, Tuesday 11 April 1989, p. 2.

[115] Publicity material for Thermedics, 1989.

[116] *The Christian Science Monitor*, Thursday 16 February 1989, p. 9.

[117] *Airport Support*, June 1989 (reprint).

process, suggesting in turn that practical efficiency may not yet have been maximised:

> "Experience has shown that if the package or luggage is opened, with a sample also being taken from the inside, the probability of finding any hidden device increases."[118]

One British security expert has gone further, voicing grave doubts concerning chemiluminescent techniques' ability to screen closed suitcases. It is feared that to create a successful system for daily airport applications, the devices would positively require to be employed upon opened cases to permit vapours and particles of explosives to circulate near to the sampling unit.[119] Certainly, although the systems currently being developed may be very efficient in identifying traces of explosives, samples sealed in vacuum packs pose theoretical problems in that they are thus unable to exude any vapours.[120] Thermedics claims, however, that in practice, even the merest traces of an explosive deposited by mistake outside the sealed area should be detectable, although this need not preclude the possibility of multiple layers of sealing being used, even so as to encapsulate an entire explosive device. Moreover, Grodzins maintains that plastic explosives' low vapour pressure will make vapour detection at best an unreliable technique when used on and in cold inanimate objects.[121]

Another central difficulty concerns the excessive length of time required to complete a screening cycle. Test versions of the Thermedics system performed at a rate of only two passengers per minute, with analysis taking as long as 25 seconds,[122] although the company's President, John Wood, has claimed that an FAA target of ten passengers per minute should be achieved in the short term, with on-site implementation following some six months later.[123] Thermedics has estimated that by 1995 appropriately fast production models should be operating in airports.[124]

The current screening rate would preclude the technique's operation at areas of fast throughput, such as at check-in desks. However, even if a target rate of ten passengers per minute cannot be achieved, the chemiluminescence apparatus may still be suitable for airport uses, because it could still be employed for emergency spot-checks of small numbers of passengers. Furthermore, assuming that the sniffing

[118] Jackson and Bromberg, p. 17.

[119] Interview with Scottish aviation security expert, Paris, France, June 1990.

[120] *The Christian Science Monitor*, Thursday 16 February 1989, p. 9.

[121] E.E. Murphy (1989), p. 36.

[122] *Time*, January 1988 (reprint).

[123] *Science*, 13 January 1989 (reprint).

[124] *The New York Times*, Sunday 25 December 1988 (reprint).

technique is almost entirely accurate in its selectivity with large and small samples alike, as its 1988 test results suggest it to be, then it might be possible to accommodate a long analysis time, provided that two conditions could be met. First, it would be essential that the screening time (that is, the first part of the procedure which does not include analysis time) would not be intolerably long for either passengers or operators. Indications from Thermedics on this matter are reasonable, showing that the SecurScan technique currently takes approximately six seconds.[125] (In the busiest times of operation, efficiency could be promoted by taking samples from several passengers and processing the consolidated sample for a single analysis.) A second condition would be that once screened, a passenger could be traced with sufficient ease to locate him or her for secondary search procedures to take place.

A key to the potential success of chemiluminescence and other explosives detection techniques is their aim of isolating an unusual and rarely carried compound - explosives. In the cases of metal detection and X-ray methods, delay and inefficiency are very often caused simply because the object types traditionally sought (metallic and dense compounds) are commonly carried on the person of travellers and in their baggage. Hence, these established devices simply identify the presence of a category of material which requires physical investigation to determine whether or not the substance located belongs to a sub-group of suspicious compounds. With any operable explosives detection system, near absolute elimination of false positives would effectively mean that the machinery would only register in the unlikely event of explosives or a loaded weapon being conveyed. As it is reasonable to expect that few such instances would ever take place, the screening process would be unlikely to trigger any alarm, so reducing the need for human intervention and increasing passenger throughput.

All that would be required of security zones would be a reliable means of holding passengers immediately after the screening point, which would often be found in any case in the form of the departure gate holding lounge. If a positive reading were to be registered, it would not be unduly difficult to recall passengers, particularly if the airport's post-screening zone were to incorporate a long, narrow corridor which would take the individuals longer than thirty seconds to pass along, or if CCTV cameras were to monitor the screening process. In the worst case, in which the offending individual could not immediately be identified, all passengers in the holding area would simply require to be brought back for the process to be repeated or for other means of screening to take place. Although such an arrangement would be far from ideal, it would at least accommodate a useful and cost-effective security technique without excessive difficulty, expense or inconvenience.

Many technologies other than TNA and vapour detection have shown signs of being useful to airport security screening activities. A number of these entail strictly classified techniques, details of which are unavailable, while others represent modifications to existing methods. A brief listing is offered below.

[125]Publicity material for Thermedics, 1990.

6.4. Advanced X-Radiography

Instead of continuing their attempts to refine the traditional radiographic methods which had already reached their developmental zenith in the 1970's but which were demonstrably incapable of meeting the demands of a new security era, many manufacturers of security X-ray equipment came to realise that a radically new system should be developed which could detect plastic objects with much greater efficiency. While advances in simple X-ray technology had resulted in, for example, clearer imaging of dense matter, the technique's overall capacity to isolate plastic weapons and explosives remained low until the mid-to-late 1980s when new production models became available offering interesting new features at a price which was readily affordable to many carriers and airports.

6.4.1. Dual Energy X-Radiography

Rather than employing only one source of X-rays emitting at a particular velocity, some systems can use two, releasing high and low energy waves respectively. The high energy waves interact with light, organic compounds, to leave little or no observable screening trace. In this respect, the system would suffer from the same inadequacy as earlier generations of machines, but for the second source. Those waves of a lower energy are more likely to be absorbed by light matter, indicating the presence of any suspicious non-metallic object.[126] By combining the two types of ray into one apparatus, therefore, a much more effective and accurate screening of both high and low density objects can be achieved. The data received from the twin scanning can be passed into an in-built computer to locate objects of a given atomic mass.[127] Observing staff can view the two-dimensional high and low density images on two television monitors which serve to reduce image "clutter".

It has been noted that dual energy techniques can suffer from an inability to differentiate between benign low density compounds and plastic explosives, because of their close chemical and physical similarities.[128] However, such systems can be made more effective if combined with other methods of X-ray performance enhancement. As shall be noted below, a means of simplifying the task of screening staff was identified in several methods of image enhancement, the aim of which is to provide electronic means of differentiating between varying matter types. The problem which required to be solved was described in the following terms by A. Kotowski, a Vice President of the US-based Astrophysics Research Corporation:

> "Just as light shadows may merge, X-ray shadows may also merge and two objects, one behind the other, may not be distinguishable except by the familiarity of each individual shadow. If too much material is present, the image may simply be black in some areas. Very fine wires or extremely small objects may not be

[126] *New Scientist*, 7 January 1989, p. 23.

[127] *Popular Science*, May 1986, p. 38 (reprint).

[128] ECAC, *Doc. 30*, appendix 10.

distinguishable. Too many individual items may produce such a cluttered image that none are recognizable."[129]

Monochrome images are particularly vulnerable to this type of problem because although many different levels of shading are able to be noted by X-ray technology, the human eye is unable to distinguish between more than a few of them. Hence, there is great difficulty in even identifying the differences in shading between objects of a similar density.[130] The eye is much more likely to observe differences in colour than variations in grey shading. For this reason, research and development of colour-coded X-ray imaging was carried out, resulting in the production of a new generation of devices using "pseudo-colour" techniques, such as Astrophysics' S-Scan system. These methods involve the computer-driven assignment of certain colours to different densities of material encountered in screening. As the criteria by which colour is assigned are density and thickness rather than density and chemical composition, it is normal for totally different colours to represent a single substance featuring varying degrees of thickness. Similarly, totally different chemical compounds which exhibit similar combinations of thickness and density can be portrayed by pseudo-colour equipment in similar colours.[131]

Some of the early colour-coding units were criticised because, in exchanging shades of grey for different colours, they failed to account for the possibility of some objects acquiring several colours at once and blending together with those of other items, occasionally concealing their true identity.[132] The employment of synthesised colours can also cause problems with resolution of fine material.[133] The evolution of more advanced colouring systems and of image enhancement techniques, however, has alleviated these situations.

With one advanced, colour-coded, dual energy system produced by the German company Heimann Systems Corporation (a subsidiary of Siemens Components based in Wiesbaden), the X-ray unit, named the Hi-Mat, is able to represent inorganic, non-metallic compounds of high atomic weights in blue and metallic substances or mixtures of densities in green. Particularly dense matter, such as steel of 2 cm thickness is coded black or grey. Most importantly, however, is the Hi-Mat's ability to isolate compounds which are unambiguously organic, such as plastics, in orange, providing a highly contrasting spectral range to ease the task of screening staff.[134]

In addition to the provision of colour, up to twenty different levels

[129]Kotowski (1986), p. 23.

[130]*Airport Support*, June 1989 (reprint).

[131]Publicity material for Astrophysics, 1990.

[132]Kotowski (1986), p. 22.

[133]ECAC (1988), paragraph 3.3 c) 4).

[134]E.E. Murphy (1989), p. 35; *Airport Support*, June 1989 (reprint); *Aviation Week and Space Technology*, 16 January 1989 (reprint).

of shading are provided, more fully to take advantage of X-ray technology's valuable ability to measure the differing densities of matter.[135] As plastic explosives contain nitrogen in very closely packed form and most ordinary organic compounds do not, critical differences in shading of the organic orange colour will be presented for each.[136] Hence, it is at least theoretically possible for an alert and well-trained guard to note the darker orange shading of plastic explosives, particularly if s/he can compare it with the lighter hue of ordinary plastic substances.

The Astrophysics Research Corporation of Long Beach, California, USA, has developed a system similar to that of Heimann, which is sensitive to X-ray attenuation rates, using only three colours. The company's E-Scan system is designed to measure atomic weights of compounds being screened by employing two X-ray systems to produce a single image, colour-coded according to chemical composition and shaded according to density and thickness. Its low density sensor produces images of material of an atomic mass lower than 10 amu (including plastics, cocaine, etc.) in varying shades of orange. Heavier compounds (including metals) are picked up by its other sensor, producing images coloured blue or (if too dense to be screened) bright green.[137] This combination of reliable, chemistry-specific colouring and secondary shading makes E-Scan superior to pseudo-colour techniques in attempting to present useful images for security personnel to interpret. The transparency of the colours used means that low density matter concealed behind a sheet of metal would still be observable in image form. However, as the colours would blend with each other, it might be difficult to identify with certainty the exact compositional structure of the lower density material.

Also, because shading of a colour will be dependent upon the density and thickness of the material being screened, it will be impossible to specify any particular colour/shading combination which could be guaranteed as being unique to plastic explosives. Hence, while advanced X-ray apparatus are useful tools in the control of well trained, observant staff, their reliance upon human intervention coupled with their inability clearly to isolate explosives, must relegate them to a lower order of effectiveness than neutron bombardment and chemiluminescence techniques. Until its differentiation is developed to be more informative than a simple organic/inorganic demarkation, such technology will enjoy only limited practical usefulness.

By April 1989, Astrophysics Research of Windsor, UK, a subsidiary of the Californian corporation, had reported 90 sales of its colour X-ray devices, costing $70,000 (US) each, with British Home Office tests having been undertaken on the system.[138] In the same year O'Ballance

[135] *Aviation Week and Space Technology*, 16 January 1989 (reprint).

[136] Vincent (1989), p. 37.

[137] Publicity material for Astrophysics, 1990; Dorey (1987).

[138] *The Times*, 13 April 1989 (reprint); *Airports International*, January 1990, p. 19.

suggested that British investment in colour-coded X-ray apparatus had been precluded by familiar British considerations of finance:

> "It is thought that one of these types of machines was recommended for UK airports in 1985, but never purchased, the official excuse then being [that it] "lacked proven efficiency", but the real reason was the cost."[139]

A possible indication of E-Scan's perceived value within the industry was given when, in 1989, Pan Am announced that it had introduced the system to its European departure points.[140] It should be clear that any form of dual energy X-ray system will be unable to provide adequate security cover in isolation. If combined with other technologies and with skilled staff, however, it could be a very useful tool in the struggle to prevent and deter acts of aviation terrorism.

In order to temper reports of colour-coded X-ray technology's strengths with some just criticism of its inescapable weaknesses in practice, it is useful to include at this point a short anecdote from Yeffet about an interview he conducted with a US security operative, describing succinctly the extent to which any security tool's success must be dependent upon high quality personnel, good operational training, recognition of the system's purposes and the implementation of well-formulated regulatory and managerial policies:

> "The man said his training consisted of one eight hour session on how to operate the X-ray machine. From this instruction, all he remembered was that he was supposed to look for the color green on the monitor, indicating metal. Dark spots, he said, are usually books but could be bombs. If he saw something suspicious, he said his instructions were to ask the passenger what it was, and if the passenger told him what the object was, he was to trust the passenger and let the luggage go through. This clearly contradicts FAA rules. I asked him what would happen if he made a mistake and then a plane blew up. He said he would have to go back for retraining. If it happened twice, he could be fired."[141]

Just as SAIC introduced its XENIS system to offer the proven benefits of X-radiography with the innovation of TNA, so Astrophysics announced in January 1990 its intention to manufacture an E-Scan system combined with neutron technology and other techniques. The new combined apparatus, known as T-Scan, is intended to meet the FAA's EDS specifications but also to offer a faster baggage processing rate than TNA at a substantially lower price.[142] This development towards producing multiple technique systems is to be welcomed because, as shall be seen below, the need for a broadly based, combined approach

[139] O'Ballance (1989) I, p. 18.

[140] *Flight International*, 22 April 1989, p. 11.

[141] Yeffet and Barnes (1989), p. 133.

[142] Publicity material for Astrophysics, 1990.

to security screening deserves to be addressed by the security industry.

6.4.2. Backscatter X-Radiography

In the late 1980s, a major screening apparatus producer, American Science and Engineering Incorporated (AS&E), of Cambridge, Massachusetts, USA, developed a new type of X-ray security screening as a variation of the dual energy technique, in which only one X-ray source is used. The physical property of light-weight atomic material to scatter X-rays towards the source is harnessed in this technique. As with other security advances, the research on the subject was prompted by medical requirements.[143] The AS&E method employs two distinct types of X-ray detection in one unit. In addition to familiar absorbed X-rays, which are collected in transmission detectors placed behind the baggage being screened, AS&E's "Z System" and "ZZ System" employ a "backscatter" technique in which detectors are placed between the baggage and the source, so as to retrieve those rays which have been reflected back from matter of a low atomic number (described by the company as "low-Z").

The X-rays are produced in a fan-shaped beam of low dosage, which is passed through a perforated wheel which rotates at a rate of 1,800 rpm. In this way, the X-ray is cut into individual "pencil beams" or flying spots which are directed to specific points in the baggage. The rays are scattered in different directions and are retrieved by the banks of detectors. By virtue of the double detector facility, the system is able to present two different image types which together cover the entire range of material densities, with dense material producing a dark image and light matter conversely glowing brightly on their respective viewing screens. Because backscatter technology is effective only with matter of low atomic weight, plastic explosives or weapons can usually be placed anywhere in relation to metallic matter. Hence, the technology will locate objects shielded behind dense metal which would be hidden from less advanced X-ray systems. Conversely, however, it must be possible for some degree of shielding still to take place between compounds of a similar density.

The technology involved in the backscatter system relies on its thin, "flying spot" beam of X-rays, the principle of which was described by scientific journalist, Steven Ashley, thus:

> " ... AS&E's patented low-dose flying-spot technology for X-rays - a pencil beam of radiation that rapidly scans an object - would allow an X-ray detector to form a video image of the X-rays that are scattered off-line by low-Z atoms. Creating an image of the scattered radiation would be impossible with a conventional X-ray machine ... because the fanlike spray of X-rays emitted by these devices would result in a fogged image. With a fan beam, scattered radiation comes from all points on the object at once, making a mess of the backscatter image. When the flying-spot beam illuminates an object, the scattered X-rays that are detected at any time are known to have originated from the particular region of the object the device is spot-lighting. The

[143] *Aviation Week and Space Technology*, 28 April 1986, p. 31.

> Model Z's processor can then collect these spot samples to form a video-image mosaic in the same way the beam flying across a TV screen creates the picture."[144]

Unfortunately, in order to present the two types of data to screening staff, the Z and ZZ Systems use two monitors, one to display a normal transmission X-ray shadow image and the other for the more unusual pictures of low density materials (the "Z-images"). With the ZZ System, the second monitor provides two low-Z images on a split screen, showing the baggage pictured from each side.[145] This means that extra manpower and/or effort can be required to view and assess no fewer than three different images simultaneously, which might result in attention spans being shorter or in interest being focussed on one screen at the expense of the other.

It is difficult to imagine that AS&E's claim of an effective throughput capability of 1,500 parcels per hour could properly be sustained in a high risk airport environment, as such a rate would require each piece to be screened in an average of only 2.4 seconds.[146] In an attempt to promote efficiency, however, a very unusual optional alarm system is included in the ZZ System. If the screening of an area of baggage results in the rays being attenuated so as to indicate the presence of a possibly suspicious low density material (displayed, for example, as a solid block on the system's low-Z monitor) an audible alarm will sound and the suspicious section of the shadow image will turn blank and alternate in shade between black and white, thus immediately indicating the compound's exact location.

The alarm mode can be set to issue a warning according to certain intensities of backscatter activity, in so doing lowering the likelihood of false positives being issued from non-explosive compounds of densities similar to those of explosives.[147] Such X-ray alarm systems illustrate the advances which have been made in the two decades since X-ray technology was introduced to civil aviation and suggest that, even in this field, the role of human operators may be diminishing. On the other hand, the use of primitive and unsophisticated alarms in X-ray technology has been criticised by Kotowski:

> "Automatic threat alert devices have been mainly limited to alarming on detection of very dense areas in an image. In general, these areas are easy to see and alarming on these areas tends to produce a false sense of security in images that do not contain them. However, in certain special screening situations, these devices have been used successfully."[148]

[144] *Popular Science*, May 1986, p. 38.

[145] *Aviation Week and Space Technology*, 28 April 1986, p. 31.

[146] Publicity material for AS&E, 6 January 1989.

[147] *Airport Support*, June 1989 (reprint).

[148] Kotowski (1986), p.23.

Misgivings about the AS&E system include doubts about its selectivity. The corporation claims that in addition to finding plastic explosives, guns and knives, the system can also be used to isolate any matter of low atomic mass, such as ceramics, currency, drugs of abuse, gems, fruit and sausages.[149] As it differentiates between materials according to atomic mass rather than, for example, to a specific nitro-group signature, it must follow that the manual system will only provide a shadow image which must still be interpreted by staff. AS&E's marketing manager, Richard W Sesnewicz, described the required procedure in the following way:

> "We tell the observer that if you see something in the Z-image that glows white, it means that the object backscatters X-rays and is therefore a low-Z material. ... The observer then has to say to himself: Do I recognise that white shape as being usual or unusual when compared with visual information provided by the conventional X-ray image? For instance, if I notice a white blob in what the conventional X-ray tells me is a radio, I have to determine whether that's normal."[150]

If the image contains many low density objects, including plastic explosives, or many high density objects, including a metallic handgun, problems of clutter may still exist. Alternatively, if the automatic alarm is employed, there must be a very real risk of false alarms being generated by innocent items of low density which resemble explosives. False positives are dealt with in the Model ZZ which incorporates an image enhancement facility to highlight the edge of recognisably harmless materials whose image signal would otherwise be too weak to be passed with confidence by screening staff. In addition, it is possible to create the illusion of expanded image density, once more to assist observing screening staff.[151]

Also, as with all X-ray technology, the alignment of the explosives or gun being screened will have a major bearing on the effectiveness of the system's non-automated visual mode. While, for example, a very thin layer of plastic explosives will appear white wherever and however it may be located, it is clear that if placed in the lining of a case such that its largest surface area is made to face the pencil-beam of X-rays, a more immediately obvious image will be presented than if the sheet were to be located around the seam of the case in such a way that the beam would be presented with a tiny surface area. Despite the system's presentation of a narrow, white line for such an alignment, only a well trained and alert security screener could be expected to find the bag suspicious. Similar identification problems are imaginable with the alignment of plastic guns, particularly if stored in component form. One means of solving this problem would be

[149] *Popular Science*, May 1986, p. 38: Publicity material for AS&E, 6 January 1989.

[150] *Popular Science*, May 1986, p. 39.

[151] Publicity material for AS&E, 6 January 1989.

to adopt the technique employed by SAIC in their XENIS TNA device, described as follows by Wilson:

> "XENIS uses a two-view X-ray that looks down from the top - the normal airport X-ray approach - and across from the side. The second view is mandatory in looking for plastic explosives which have been moulded into the luggage in a sheet. With the combination system, the specific object registered as a possible threat is identified in red on the screen."[152]

Furthermore, with the original Z System, the second monitor provides a backscatter view from only one side of the baggage being screened. Because it lacks the ZZ System's extra bank of detectors which provides all-round coverage of the case, it is necessary to scan each bag twice, turning the bag after the first scan. Otherwise, the backscatter image might not provide a sufficiently accurate shadowgraph of the whole object, risking the possibility of an explosive wall lining being missed entirely.[153]

Costing approximately $70,000 (US), the Z System is at least twice as expensive as conventional X-ray apparatus, though priced below either TNA or chemiluminescence devices.[154] It is able to penetrate 3/4" stainless steel and can display single tinned wiring of 36 AWG thickness. This degree of resolution is very impressive, even in modern machines.[155] Other useful features of Z technology are its portability, with one backscatter system being able to be transported in the back of a small van, and its capacity to screen objects of any length, up to 42" in height and 32.5" in width.[156]

In 1990, AS&E announced the launch of a fully automated X-ray system designed to compete with TNA screening systems, but costing only $200,000 (US). The firm claimed that their new device would be able to detect explosives in packages as small as that used against Pan Am Flight 103 and that its false alarm rate would be comparable with that of TNA, at around five per cent. Relying on fewer staff members than unautomated systems and using simpler technology than TNA, the apparatus would be cost-efficient in terms of current labour levels. In addition, personnel would be assisted by the provision of high quality X-ray images, hence aiding subsequent physical search procedures.[157]

[152]Wilson (1989), p. 16.

[153]Publicity material for AS&E, 6 January 1989.

[154]*Popular Science*, May 1986, p. 38; *Aviation Week and Space Technology*, 28 April 1986, p. 31.

[155]Dorey (1983), p. 226.

[156]Publicity material for AS&E, 6 January 1989.

[157]*Airports International*, January 1990, p. 19.

6.4.3. Image Enhancement and Processing

In addition to producing colour and/or shading differentials, some X-ray systems such as AS&E's Model ZZ can produce electronically generated enhancements to the picture being viewed by staff. The examples of televisual and digital zoom facilities might be classified as early precursors of these processing forms because their aim was to permit closer examination of the X-ray data, with the intention of providing greater detection opportunities for security personnel. More sophisticated systems of the late 1980s have produced images of a quality unimaginable until very recently. The advanced technique of X-ray computed tomography (known as CT scanning) involves the multiple scanning of baggage to produce a two-dimensional image which gives the impression of possessing a third dimension, showing relative densities of the articles within the bag.[158] Breakthroughs in computer technology have further broadened the scope for image enhancement to be made.

With Heimann's Hi-Cat system, for example, objects of critical density levels can automatically be made clearer in their X-ray images by using its processing facility to trace around their image contours, illuminating their shape in higher contrast.[159] This increase in contrast improves the general visibility of both brighter and darker patches and makes easier the discovery of otherwise badly defined features, such as wiring.[160]

Other methods include a multi-functional computer enhancement technique which provides staff with up to ten image processing options to help clear suspect baggage without requiring to resort to time-consuming physical searches. By, for example, lightening an image, compounds of higher densities can be examined closely, while darkening the picture enables detailed inspection of subtle variations in low density shades.[161] Although this may provide a useful tool in the hands of experienced staff working without pressure of time, it is to be expected that the options would quickly be forgotten during instances of high passenger throughput at airports. Instead, a more direct and immediate form of warning would offer greater benefits for high pressure screening work.

Another aid to efficiency for X-ray systems is computer pattern-recognition, which can be used to automate detection by filtering out familiar shapes from the image being viewed.[162] A variation of the shape recognition idea is the notion of memorised shape descriptions which are compared with the shapes of objects being screened in

[158] ECAC, (1988) appendix 10: *Airports International*, January 1990, p. 19.

[159] *Airport Support*, June 1989 (reprint).

[160] Kotowski (1986), p. 23.

[161] *Ibid.*; *Airport Support*, June 1989 (reprint).

[162] *Popular Science*, May 1986, p. 39.

baggage.[163] This addition to apparatus would be of little use in countering the threat of plastic explosives which can be moulded into any shape, but may have a role in detecting familiar handguns and other hazardous objects of recognisable shape, including dangerous items placed innocently in baggage.

Perhaps the most difficult problem currently to be overcome in developing new X-ray devices is the low level of personnel ability to isolate plastic explosives by using the equipment. Meaningful improvements in atomic mass recognition, colour coding and automated alarm efficiency might constitute distant goals, but they are, nevertheless, worth pursuing, in an effort to improve detection capacities. Equally, it must be borne in mind that any security advance is likely to be mirrored by terrorists' efforts to overcome it.

If airports were, in future, to be equipped with X-ray systems capable of presenting plastic explosives as a clearly identifiable image, terrorists might be forced to adapt their modes of attack as they could no longer be confident of concealing the organic compound in an inorganic environment such as a radio. They would thus be compelled to locate the substance in the midst of other matter of similar atomic weight, once again making X-ray screening more difficult to achieve effectively. In such circumstances, it is foreseeable that the spiralling progression of advances between security developers and terrorists could be continued *ad nauseam*. If, instead, advanced X-ray units were to be viewed merely as one component which could be used by carriers and airports in conjunction with other sophisticated media, such as TNA and chemiluminescence, then the terrorists' prospects of evading security controls might be reduced markedly, even in the long term.

6.5. Other Technologies

6.5.1. Fast Neutron Activation

Employing TNA's gamma ray detection rings and its software, Fast Neutron Activation (FNA) is similar to its technological stable-mate. Instead of a cloud of low energy neutrons being used, FNA employs high energy neutron pulses which cause considerable gamma ray activity not merely in chemical structures containing nitrogen, but in those which also contain carbon and oxygen. This activity produces a much more accurate indication of nitrogenous substances' composition, allowing more detailed comparisons to be made between samples and memorised data. As explosives typically contain high concentrations of nitrogen and oxygen but a low concentration of carbon, the FNA explosives signature is readily identifiable, making the system likely to be both more accurate and less prone to false positives than TNA. The development of FNA suffered a setback in February 1989 when FAA funding from which scientists researching it (at the advanced nuclear technology group of the Los Alamos National Laboratory, New Mexico) might have benefited was diverted to another system. The benficiary was another research programme involving fast, pulsed neutrons generated by a particle accelerator, which promised even greater

[163] *Airports International*, January 1990, p. 19.

accuracy. The drawback of the latter venture is the cost of the accelerator involved - currently over $1 million (US).[164]

Another variation of neutron technology is a technique called hydrogenous explosive detection (HED) which employs neutron bombardment from a cobalt source to identify water-based compounds, including most explosives. As with TNA systems, the different forms of scatter from the materials being screened provides evidence of the substance's chemical composition.[165] Although priced at a competitive £7000, current HED methods suffer from high false alarm rates.[166]

6.5.2. Gas Chromatography

Another version of vapour "sniffing" involves gas chromatography, in which a process known as "electron capture" is used. Either walk-through or hand-held systems can be produced using the technique, which relies upon explosive vapours' propensity to attract electrons. If the vapours in question are subjected to an electrical current, some of the electron flow will be captured by the sample, resulting in a measurable decline in the total current.

A.I. Security of Cambridge, UK, has developed a system based on this technique which, the firm claims, is sensitive to one part of explosives vapour per hundred billion parts of air. The firm's portable device, known as Model 97, is specified as being able to detect commercial and "most known military explosives" and to do so with a typical response time of two seconds. It comprises a sampling unit which is passed around the outside of the object being screened and an analysis unit which is located in a large attaché case. Air samples are sucked into the device and separated through the implementation of the physical process of gas chromatography. If chromatographic indicators suggest that explosive vapours might be present, the gas sample containing the vapour in question is passed through a chamber containing a stream of the inert gas, argon. With two independent flow paths then being used to provide one "control" flow by which to judge activity in the other, half of the gas sample is passed over a specially coated surface, designed to slow the progress of explosive vapours. The two mixtures then enter ß-particle clouds, at which point measurements of electron capture are taken. Decrease in current and time differences in the flow of the two samples can indicate the presence of explosive compounds. If explosives are confirmed as being present, a visual alarm is activated (with the option of an audible one also being triggered if set to do so) alerting staff of some unspecified threatening substance being present.[167]

The sampling problems of any vapour detection system apply to this

[164]E.E. Murphy (1989), p. 35.

[165]Clutterbuck (1990) I, p. 59.

[166]Clutterbuck (1990) II, p. 145.

[167]Publicity material for A.I. Security, 1989: *Discover* June 1986, p. 26.

technique, making it less than 100% reliable. Nevertheless, it exhibits potential for great practical utility, as it is both swift in its operation and highly portable. Although interference and resultant false positives may be suffered from non-explosive vapours which resemble those of known explosives, the Model 97 includes a useful warning mechanism, which alerts staff of the interference, allowing them to decide on the need for other modes of screening to take place.[168] In this way, the worst effects of false alarms can be avoided, the non-explosive response facility providing useful additional information which a simple blanket alarm could not. Viewed from a more critical standpoint, the apparatus would be better suited to high turnover airport applications if it could provide more accurate vapour analysis which might remove entirely the need for such a non-explosive response facility. The Model 97 hand-held system is in operation in a number of aviation locations and, most notably, was installed at Seoul Airport, South Korea (a high risk venue), prior to the 1988 Olympiad.[169]

A Canadian firm, Scintrex, has utilised highly advanced gas chromatography in the production of a nine feet long passenger tunnel system designed to screen passengers at security points. The persons walk the length of the tunnel, in which they are exposed to streams of warm air, intended to promote the release of explosives vapours. Any such vapours present are sensed by detectors built into the tunnel, causing alarms automatically to be issued.[170] It is also worth noting that Canadian research has produced a screening system based on nitrogen ion vapour detection, which Canadian authorities hope will be able accurately to identify trace levels of explosives in as little as three seconds - a remarkable combination of attributes.[171] Two common failings of many less sophisiticated gas techniques based on similar principles are their inability to detect explosives with particularly low vapour pressures and their reliance upon long analysis times.[172]

6.5.3. Mass Spectrometry

Air sampling also takes place to enable mass spectrometry to be used for detection purposes. As with the process's more familiar laboratory operation, security versions of the technique analyse samples so as to isolate an unmistakable chemical "fingerprint" of the substance. Once the sample's constituent elements have been separated, the molecular mixture can be charged from a radioactive source, enabling the process of mass determination to take place by accelerating the resultant ions through magnetic fields which bring about element-specific path deflections. As a result of this, the presence and relative preponderance of each substance is discovered.

[168] Publicity material for A.I. Security, 1989.

[169] *The Daily Telegraph*, Thursday 29 December 1988 (reprint); *New Scientist*, 7 January 1989, p. 23.

[170] *The Times*, Thursday 22 March 1990, p. 33.

[171] J. Rodocanachi in Lewis and Kaplan (1990), pp. 284 - 285.

[172] *Ibid.* and *Discover*, June 1986, p. 29.

If suspicious compositions are identified, an alarm is triggered, alerting staff of the need for further inspection.[173]

British Aerospace of Bracknell, UK, has developed a mass spectrometry device (the "Condor" system) which was produced initially to assist Japanese customs authorities in their searches for drugs of abuse and explosives.[174]

6.5.4. Infrared Sensing

Another interesting technology which might be utilised for aviation security purposes and which could be used safely with humans is infrared sensing, in which a video image of an individual is created from body heat measurements. Infrared sensors would differentiate between typical body heat of passengers and "cold spots" caused by inanimate objects of lower temperatures which absorb and block even minute amounts of body heat. In this way a shadow image of the suspicious object would be available for staff to assess, making subsequent physical search selection of passengers more reliable.[175]

The principal use of such equipment (which might be incorporated into metal detection archways) would be to overcome the threats posed by plastic handguns and explosives carried on or around a terrorist's person. Drawbacks include the fact that most plastic handguns are readily disassembled into their component parts, making recognition very difficult and the reliance which such a technique would involve upon human involvement, observation and discretion. Also, at present the imaging capacity of infrared sensing is very poor, making recognition of shapes very difficult, although the development of image enhancement should improve the technique significantly.[176] If a fast processing speed could be achieved, infrared screening might be an attractive proposition for certain higher risk airports and airlines, with the technique being combined with others to increase efficiency further. William Crenshaw has observed that infrared or sonic imaging might in future be employed in conjunction with "anomaly detectors" designed to identify the presence of an unusual density or mass not normally found at a certain point, such as on a person's body.[177]

6.5.5. Dielectric Measurement

This system utilises the physical feature of capacitance (the varying ability of substances to hold a charge) to identify explosives. It was developed as early as the 1970s and was used to identify letter

[173] Wilkinson (1989) IV, p. 19; Clutterbuck (1990) II, p. 144 - 145.

[174] *The Daily Telegraph*, Thursday 29 December 1988 (reprint).

[175] *The New York Times*, Sunday 25 December 1988 (reprint).

[176] Clutterbuck (1990) I, p. 60. See also Clutterbuck (1990) II, p. 146.

[177] W.A. Crenshaw (1987), p. 136.

bombs at that time.[178] Despite promising field test results, the screening method was not developed for aviation security purposes.[179]

Other new techniques of explosives detection are currently being developed, about which little aviation-related information is available. Included in this category are systems using plasma chromatography, bioluminescence, enzymatic activity, nitrobenzene vapour detection (thought to be unsuitable for airport applications) and laseroptoacoustic spectroscopy.[180] In addition, Clutterbuck has drawn attention to the possibility of developing electronic device detection techniques and advanced human sense aids.[181]

6.6. Conclusion: Assessment of Security Technology's Role

The above analysis of current research and development projects' most recently publicised innovations clearly indicates that a diverse range of advanced technology may soon be available to the aviation industry. Unfortunately, it is also evident that each apparatus exhibits weaknesses as well as strengths in its detection capacities, necessitating the conclusion that security loopholes are bound to remain if excessive trust is placed in too restricted a range of technologies.

Shortcomings in new methods, however, can only add extra momentum to the push for further development, because once relevant technologies have been raised to an employable level, resultant devices will be able to provide essential support for the security sector of the industry. On a more positive note, the Thermedics president, John Wood, observed in 1988 that great progress in the technology involved in explosives detection had been made since 1985, at which time no system had yet proved capable of operating to suitably high levels of screening efficiency.[182] It is reasonable to predict that a continuation of FAA support in the detection programmes which it helped to initiate would guarantee the commercial availability of highly advanced, portable and efficient apparatus based on the above noted principles before the end of the 1990s.

Despite the demonstrable weaknesses of the new generation of devices, some aviation authorites have introduced new technology while others are set to do so in the near future at certain key airports.[183] More widespread acceptance of essential new technology can only be brought about after screening efficiency and cost-effectiveness have been improved, yet with terrorists' offensive capabilities advancing daily.

[178] Wilkinson (1989), p. 19.

[179] Clutterbuck (1990) I, pp. 59 - 60; Clutterbuck (1990) II, p. 146.

[180] *Airport Support*, June 1990 (reprint); Clutterbuck (1990) II, p. 145.

[181] Clutterbuck (1990) I, p. 190.

[182] *The Boston Globe*, Friday 23 December 1988 (reprint).

[183] *Flight International*, 6 May 1989, p. 13.

it is now no longer acceptable for aviation authorities to look for long term solutions. Progress in security technology cannot be delayed for another decade and should not be delayed at all. Neither should there be any doubt that adequate security coverage can only be achieved through the adoption of a multi-layered approach to technology utilisation. As SAIC's Bozorgmanesh honestly noted with respect to the firm's own TNA systems:

> "[One cannot] claim that installation of the TNA by itself will provide 100% secure flights. In fact, no single piece of security equipment or security procedure by itself can provide such a guarantee."[184]

Properly administered security demands a wide selection of processes, operating together to preclude all possibilities of attack. In terms of landside/airside security screening this must mean that no one technology should be trusted as though an instant panacea. Instead, only through the imaginative adoption of effective technology combinations will protection against terrorist attack be maximised. At present, it is possible to combine TNA with X-ray and chemiluminescence vapour sniffing with metal detection in two efficient units, to assist in the isolation of suspicious objects. Only a small technological step would be required to combine these and other screening techniques in a labour-efficient continuous flow system.[185]

In future, the possibility of more fully integrating advanced technological methods into one unified "multimode approach" to baggage screening, handling and reconciliation should be investigated.[186] Were it to prove feasible, computerised processing of baggage and passenger screening results would enable security staff to use a form of high technology physical profiling which is currently impossible to achieve but which, if sufficiently efficient, could be invaluable in the quest for hidden explosives.[187]

An advance which might be facilitated by integrating several techniques is that of overcoming the sensitivity/selectivity problem, described above with reference to several technologies. If a variety of different techniques was made to "overlap" and produce adequate screening results in concert, then a concomitant benefit might be that the margin of screening "overlap" would accommodate an overall reduction in device sensitivity. Thus, if standard metal detection techniques were used on the person of a passenger in conjunction with advanced vapour detection and infrared sensing, it could be expected that the sensitivity of the metal detector could reasonably be reduced within responsible bounds (to promote faster throughput) without

[184]Bozorgmanesh (1990), p. 6.

[185]Clutterbuck (1990) I, pp. 185 - 186.

[186]T. Szekely and F.T. Fox, "Airport Security: an Automated and Integrated System". *Airport Technology International 1989*. p. 183.

[187]*Science*, 13 January 1989 (reprint).

jeopardising the performance of the entire process. This is the case because any device evading the metal detector would display different characteristics which would be observable with the other screening techniques. Hence, the prudent combination of security screening methods could be expected to reduce false positives by comparison and mutual verification techniques. Instead of slowing passenger flow, therefore, appropriate multiple screening carried out simultaneously could, in future, be a vital means of increasing efficiency and effectiveness - actually reducing delays. It is a positive sign that the FAA has now turned its research efforts to finding workable security screening combinations to be integrated into a unified system.[188]

Another advantage offered by the combined approach concerns the increased capacity of airport technology to find elusive, "low-technology" improvised explosive and incendiary substances.[189] While individual means of screening can locate several of these "homemade" compounds, there can be little doubt that an integrated screening system would maximise detection probabilities. Clutterbuck has remarked:

> "Improvised explosives present a particular problem because there are so many innocent pairs of materials which become explosive when brought together. Well-known mixtures include fertilizer and fuel oil, and the so-called `Co-op' mixture of nitro-benzine and sodium chlorate. Most such mixtures do, however, contain considerable quantities of nitrogen compounds and it is these which currently provide the commonest characteristics for detection either by vapour or by neutron bombardment."[190]

Moreover, as Dudley has pointed out, there must always exist a danger of air offenders attempting to infiltrate innocuous materials through a security point, only to combine them on board an aircraft to form an explosive or incendiary device which can be left concealed in the passenger cabin at a stop-over disembarkation point:

> "The major problem lies in the fact that it is possible to construct bombs from the simplest and most harmless substances and if these bombs are in fact put together on the aircraft, it becomes impossible to spot the terrorist before he has boarded."[191]

Some easily obtained substances can cause problems, even in isolation.

[188] McGuire (1989), p. 3.

[189] *Ibid.*, p. 4.

[190] Clutterbuck (1990) I, p. 53.

[191] Dudley (1976 - 77), p. 72. Consider the case (described above) of the Korean aircraft destroyed in November 1987 by a binary explosive, which could have been taken on board the target aircraft in its component form, to be combined on board prior to the offenders disembarking.

McGuire has described an incident in South Africa in which only 200 ml of concentrated sulphuric acid was released within a Fokker F-27 aircraft:

> "Fortunately, the acid spilled while the aircraft was on the ground and evacuation of 43 passengers was possible. It took the fire department three hours of spraying with bicarbonate of soda to neutralize the small amount of acid, which nonetheless destroyed the baggage of nine other passengers."[192]

This episode illustrates the difficulty involved in predicting the source of sabotage threats. While authorities meet to decide on tactics to deal with the obvious and demonstrated risks posed by plastic explosives, it is possible that terrorist groups are realising the ease with which more simple explosive and incendiary devices could serve their causes. Eventually, it is conceivable that non-fissile (or possibly fissile) nuclear materials, chemical and biological weapons and advanced guided missiles could be targeted on aviation.[193] The reactive tendencies of states in dealing with issues of security suggest that the world will not be adequately equipped to counter these difficulties when they appear.

By definition, incomplete security affords complete vulnerability, because a terrorist will always be interested in how lax security actually is as a whole rather than in how impressive it can be at specific points. Indeed, the hard lesson for security must be that as terrorist skills are constantly being forwarded by the necessity of diversity, even total vigilance cannot permit total confidence for airports, justifying further the use of multiple security safeguards as integrated components of a unified, yet constantly developing, defence system. The ultimate success or failure of airport security will continue to depend upon the quality of infrastructure, technology, techniques and, above all, human ability in securing the aviation environment. Particularly in future, when unprecedented pressures will be exerted on the civil aviation industry, it will prove necessary to impose structures of security which permit timetables and screening systems to operate in tandem.

[192]McGuire (1989), p. 7.

[193]MacKenzie-Orr, (1988) pp. 2 - 3.

CHAPTER 7

IMPLEMENTING IMPROVED SECURITY SCREENING IN THE AIRPORT ENVIRONMENT

> "Five or six years ago, the present increase in traffic was not being forecast."[1]
>
> "With passenger numbers expected to double by the turn of the century and intensified public debate on airport congestion, strengthened security procedures should not impede passenger flow."[2]

7.1. Introduction: The Future of the Aviation Market and its Implications for Security

The changing nature of air transport and its regulatory structures in the late twentieth century has revolutionised the role of the aviation community. In addition to rich travellers and influential executives, the world's larger international airports now witness the passage of persons from all social and economic groupings in huge numbers and in search of a vast range of flights. Where once airports were little more than points of embarkation, recent years have shown them to have become centres of frenetic activity and intense competition, increasingly regimented by the growing needs of punctuality and governed by the unwavering rules of the market place.

In future years, as laws of survival become progressively applied to the financing of aviation, the healthy members of the community will increasingly reap the benefits of a swelling market freed from governmental controls and so enabled to grow, while unfit operators will wither with the evolution of deregulatory measures.[3] Already, financially leaner times for many have made airports and airlines alike conscious of the need to conserve resources. As a result, much-needed spending now sometimes fails to be made in such vital areas as fleet replacement and maintenance, while carriers' quality control activities often fail to be enforced by state regulation and monitoring, to the detriment of the fare-paying passenger. As has been noted in the Press:

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[1] G.O. Eser, *International Herald Tribune*, Monday 15 May 1989, p. 2.

[2] G.H. Lipman, *Plane Facts*, January 1989, p. 1.

[3] Note that since the introduction of deregulatory policies in the United States in the late 1970s, the number of major civil airlines operating within the country has shrunk from approximately 20 to eight. *The Guardian*, Friday 2 November 1990, p. 13.

> "What is worrying the industry (and particularly the manufacturers, which bear the brunt of bad publicity when one of their jets cracks up) is that the boom in air travel and deregulation have created a climate in which the aviation industry is courting disaster; some airlines are systematically flouting safety regulations and ignoring routine maintenance procedures, while the regulatory authorities are an increasingly inadequate police force."[4]

Even more important than these factors, however, is the state of the world's aviation security provisions. As Noel Koch, President Ronald Reagan's counter-terrorism adviser in the Pentagon, remarked in 1989:

> "Deregulation intended to make the industry more competitive has led to intensive cost-cutting ... [The savings are] realized by an absolutely minimal approach to spending where security is concerned."[5]

In future, the prevailing economic conditions which have led some groups within the industry to restrict spending on vital areas of safety could increasingly be applied as justification for cost minimisation in the equally "invisible" sector of security, in which much of the expense involved concerns activities which passengers never see and so cannot easily assess. The problem of economising on security can be particularly acute where the activities are carried out by airports rather than by airlines because, as was observed in 1989:

> "Passenger concern over safety, and by analogy, security, places a commercial pressure on airlines not to cut corners. No such pressure applies to an airport operator unless air travel itself is seen to be so dangerous that passengers switch to other modes of travel. For the airport operator commercial pressures work in the opposite direction."[6]

Indeed, regulatory changes coupled with resultant commercial pressures were alleged in 1986 to have caused a British airport to have had its police presence reduced and certain police functions to have been transferred to lower paid, less skilled security staff.[7] Contrary to this indicator, if the terrorist experiences of the 1980s can teach the aviation industry and its users anything, it must be that - despite the costs, the industry's tendencies towards cost reduction and the increased workload required - rigorous, effective and adequately funded aviation security is now a more vital requirement than ever before, as the ingenuity and ruthlessness of terrorist groups cannot lightly be forgotten.

In the age of the radio bomb and the concealed detonator, airports

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[4] *The Sunday Times*, Sunday 5 March 1989, p. A17.

[5] *International Herald Tribune*, Tuesday 4 April 1989 (photocopy).

[6] House of Commons Committee on Transport (1989), p. 2.

[7] House of Commons Committee on Transport (1986), p. 6.

must play a crucial role, not simply as airline hubs and passenger processors, but as filters of arms and explosives for the international civil aviation community. As the principal points of entry into the world's air system, airports occupy a position of key strategic significance in foiling the schemes of violence which threaten so many innocent lives. In turn, the many agencies and authorities which together facilitate the operation of these airports jointly hold a central responsibility in ensuring that the necessary filtration processes of aviation security are allowed to act to their fullest potential.

Historically, the overall record of airport security has been reasonably high with the techniques of the early 1970s originally operating well for the benefit of airport users.[8] However, the new dynamics of civil aviation are bringing with them new dangers to accustomed standards and assumptions. In future years, with passenger throughput at major international airports expanding at an alarming rate, the already pressurised security system will be forced to face new threats of overload.

Already in the United States, a security crisis exists because screening for most domestic flights was not upgraded in tandem with the regulatory changes. The liberalisation allowed the domestic market to expand at such a rate that by 1985 over one million passengers boarded approximately 15,000 flights offered by US carriers each day.[9] As a result of managerial negligence, security is lax on many routes and may now be unable to be realistically increased to a sufficient level without requiring almost unbearable extension of check-in times and passenger queues. This was admitted in 1989 by Ray Salazar, then the FAA's head of security operations, who noted that an obligation to screen all domestic baggage would "affect travel dramatically."[10] As the US domestic security philosophy has been based in large measure upon the ill-conceived criterion of low risk flights requiring only low priority security, any sudden development of a new and brutal terrorist threat to airline passengers could pose major screening problems for the US aviation industry - currently processing over four times the population of the United States through 1,300 security points each year[11] - as well as for the political bodies which regulate it.

Internationally, the problem of market growth also requires to be analysed and solved rapidly. Presently, for example, the crowded routes of the industrialised western states are expanding at a rate of

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[8] Vincent (1989), p. 31.

[9] Air Transport Association data quoted in W.A. Crenshaw (1987), p. 64.

[10] Yeffet and Barnes (1989), p. 137.

[11] T. Strentz, "Radical Right Terrorists vs. Radical Left Terrorists: Their Theory and Threat," *Flight Safety Digest* (April 1990), p. 3. Strentz also quotes information provided by Salazar in 1990 suggesting that US carriers offer more daily departures than all others combined.

approximately eight per cent per year.[12] Although percentage annual increases in passenger throughput declined in the late 1980s, the global rate of growth continues to present worrying indications of airport congestion problems being compounded in the 21st century, with key areas of growth being located in zones where security has traditionally suffered from a low priority. Statistics published by the International Labour Organisation in August 1989 illustrate the nature of the difficulties involved:

> "World airline passenger traffic rose an average of 7.1 per cent between 1970 and 1986 in spite of the recession and oil shocks. Annual passenger growth of around 5.3 per cent is forecast through the year 2000 along with an overall increase by as much as 57 per cent in the world's fleet of civilian jet aircraft.
>
> Yet the pattern of expansion will not be uniform world-wide. Asian and trans-Pacific traffic is expected to climb 7 per cent annually whereas it will average less than 5 per cent for European, US and North Atlantic routes combined.
>
> At the same time fundamental changes in air transport policies are in motion, spearheaded by escalating deregulation and privatisation."[13]

If a total throughput figure of 1,075,927,000 passengers on scheduled international and domestic flights is adopted for 1988[14] and an average annual increase in world passenger traffic of 5.3 per cent is taken to apply from 1988 "through the year 2000" and just beyond it, then by the year 2002 global passenger flow would exceed twice the

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[12] "What is the Role of a Consultant in Civil Aviation Development?" *ICAO Bulletin*, September 1989, p. 39.

[13] *ILO Information*, 25/3 (August 1989), p. 8. The ILO has also suggested that the expansion of the civil aviation industry may result in making aircraft production the world's single most lucrative manufacturing sector. *ILO Information*, 26/3 (August 1990), p. 8.

[14] ICAO data in ICAO, *Civil Aviation Statistics of the World, 1988*, (Montreal: ICAO, 1989), p. 34.

original total. The cumulative effect of the 5.3 per cent multiplier is illustrated in the table below:

TABLE 7.1.

PROJECTED GROWTH OF CIVIL AVIATION MARKET, 1989 - 2002

YEAR	(PROJECTED) GLOBAL PASSENGER FLOW
1989	1,132,951,100
1990	1,192,997,500
1991	1,256,226,400
1992	1,322,806,400
1993	1,392,915,100
1994	1,466,739,600
1995	1,544,476,800
1996	1,626,334,100
1997	1,712,529,800
1998	1,803,293,900
1999	1,898,868,500
2000	1,999,508,500
2001	2,105,482,500
2002	2,217,073,100

If, as is confidently predicted, airline activity doubles in volume into the early 21st century from its 1988 figure,[15] familiar security activities will require to change in a great number of airports, simply in order to handle the new influx of travellers from terminal halls into departure lounges. In particular, many Asian locations which have not accorded security full recognition in the past, will be placed under enormous new processing pressures. It is these airports which will also require to upgrade security drastically, not least because of the threat which might easily be posed by indigenous offenders or by external terrorist groups utilising the weaknesses presented to them. The case of Bangkok in April 1988 may have established an unwelcome precendent in this respect.

In addition, crowded terminals already place many airports' operating space at a premium, making the physical expansion of security almost impossible in some locations and, more generally, incompatible with growth objectives of the industry as a whole. In the absence of technological innovations in screening capabilities, simple arithmetic would dictate that a doubling of passengers under presently encountered inefficient security screening conditions could require either great extensions to the current processing time for passengers and their baggage through existing screening techniques (in turn compounding problems of delays and resulting in "security bottlenecks") or else the installation of much additional screening equipment into already cramped airports.

As neither of these solutions offers viable long term benefits to passengers, it follows that a delicately balanced combination of measures and methods must be found, including the best available technology, in order to make security screening more efficient in

[15] *Plane Facts*, Issue 9, (January 1989), p. 1.

terms of both time usage and reliability. Of course, the combination of technological limitations, growth in the aviation market and a need to improve screening efficiency may result in there being grave difficulties in producing the type, quality and quantity of advanced screening apparatus and new procedures which are sought. In that case, if security were to be treated with due respect, there are unavoidable moral and practical grounds for concluding that current passenger processing rates would require to be forced downwards to avoid the undesirable possibility of screening quality being prejudiced further. This is a prospect which would not be greeted enthusiastically by the industry, as an increase in labour-intensive searching would both place enormous pressure on already overcrowded airports and inhibit the planned growth of airline activity. In an amoral industry, it is reasonable to predict that such conditions would result instead in a wholesale reduction in the quality of security, tempered only by frenetic but short-lived bouts of activity after the occurrence of an atrocity, to prevent a public crisis of confidence in the industry.

7.2. The Pressing Need for Technological Advances

If expensive and lengthy research and development efforts were eventually to produce affordable and sophisticated security technology, the requirement to resort to more laborious forms of inspection could be reduced or removed but the need for a reappraisal and restructuring of security would remain. It is clear that neither the option of upgrading security technology nor that of resorting to more time-consuming methods is at all attractive, although each is to be preferred to a continuation in the increase in sabotage fatalities which could be expected if inactivity were allowed to prevail. A statement made by Gerry Edwards, aviation security consultant and former Chief Superintendent of Sussex Police at Gatwick Airport, sums up the dilemma which requires to be resolved by each airline concerned with security costs:

> "Its profit margins are small and therefore heavy security costs seriously affect expansion and profitability. Nevertheless it has to meet the costs of resisting terrorism otherwise the travelling public will lose faith in the airline, further cutting profits."[16]

Edwards' second statement would, in practice, apply only with the addition of the proviso that airlines perceive the threat of terrorism as applying to them and then make the conscious decision to introduce sufficient security measures to allay public fears. With expensive security investment often being required to be made in features which would be invisible to travellers, such as good staff training, adequate manpower throughout an airport and computerised and integrated access control systems, there must always be a misguided temptation for the industry to increase spending on areas which involve a lower financial outlay but which the public will see, in order to give a false impression of adequacy.

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[16] G. Edwards, "Fragmented Security at British Airports", *Terror Update*, (September 1989), p. 5.

Ultimately, if the industry views security in terms of financial profit and loss, any genuine improvements will most likely be made in the aftermath of a security crisis of which the travelling public takes note and upon which it makes rational decisions concerning future consumption of aviation services. This disturbing possibility was illustrated in 1986 by the British Select Committee on Transport:

> "Commercial operators cannot be expected to operate other than according to commercial priorities. After the El-Al incident at Heathrow, the Committee visited the airport for the second time during this inquiry and found, in the words of a Transport and General Workers' Union shop steward, security to have improved by 100 per cent. It was only a month before that incident, however, that representatives from one airline were urging the Committee to recommend that the Secretary of State reduce security requirements. The difference was perhaps less of a difference between operators, than that in the meantime security had become a commercial issue."[17]

It is profoundly sad that security enhancement and reform might be dependent upon such unpredictable and unreliable commercial considerations as these. It is unlikely that the expansion of the aviation market will be substantially inhibited by the threat of terrorism partly because of the importance to the industry of profitability and growth in the competitive setting, but also because of the statistically low frequency of aviation terrorism incidents, which can present an illusion that particular aviation interests are highly unlikely to be targeted. In truth, statistical data from even the very recent past can have no relevance whatsoever to the future, because the scope of aircraft and passenger vulnerability to acts of hijacking and sabotage now provides a virtually free and open market for adequately prepared terrorists. Hence, gaming odds are entirely irrelevant to the problem. The low incidence of terrorism is due less to the security measures of the profit-oriented industry and more to the charitable inactivity of those who could repeatedly assault aviation but who, as yet, have elected not to do so.

If the above-noted factors alone were threatening the efficacy of the world's security system, there would be sufficient reason to voice deep concern at the speed at which the juggernaut of deregulation and profitability is progressing towards the next century. Yet, developing in parallel with them is the equally pressing problem posed within airports themselves, by operators seeking to subordinate considerations of security and its organisation to those of passenger processing efficiency and profit maximisation.

7.3. The "Competing" Interests of Security and Facilitation

In any public commercial undertaking, profitability must always be of primary concern, both from the viewpoint of a business's legal obligations to its shareholders and in terms of basic survival in the marketplace. The growing competitiveness within aviation must be accompanied by airports and carriers increasing their concern for retaining a foothold in the industry while the threat of corporate

[17]House of Commons Committee on Transport (1986), p. 14.

rationalisation and the dangers of overextension of investment cannot be viewed as remote problems for many operators within the industry.

In such an economic climate, efficiency is of utmost and constantly increasing significance because, for example, if one airline can introduce an appreciably more streamlined and effective computerised reservations and ticketing system than its immediate competitors a potentially vital economic advantage will have been gained, which may lead directly to increased profits or decreased losses, in turn helping to fend off an unwelcome merger or avoid liquidation.

On the micro-operational level also, efficiency is crucial, with facilitation of passengers and the accurate fitting of departures into their tightly scheduled runway "slots" each being prime managerial concerns. It is obvious that the aim of facilitation and security personnel at airports should be identical - namely to promote, achieve and maximise the safe and efficient handling of departures. In practice, however, it seems that economic pressures can cause security operations to be subordinated, not simply to concerns of swift but responsible throughput, but rather to the unbridled demands of timetable management. As a transport union official told the Transport Select Committee, "commercial pressures to ensure the rapid movement of passengers [conflict] with detailed security procedures."[18]

A key example of this is often to be found in airlines' attitudes to "late passengers" who arrive at check-in desks or departure gates after the posts should have been closed but who, nevertheless, are processed for their flights and rushed through security checks to catch their departures. A strong case can be made for such actions, particularly where flight connections have to be made after a first leg aircraft has arrived late. Also, striving to maximise seating efficiency seems to many carriers a more attractive option than reprocessing tickets or having to contend with irate passengers. Despite these factors, security must not be prejudiced by petty negligence and considerations of convenience. As Yeffet noted after observing security for a flight from Los Angeles International in January 1989:

> "As departure time approached, tardy passengers began arriving. None were searched. A late passenger is always a security threat; you have to assume that he is relying on the last-minute rush to help him smuggle something on board. To do the job right, attendants would have to hold the plane, but their preoccupation at that point is to get it away from the gate on time."[19]

A commercially less attractive option, but one which might be more popular with the majority of passengers who arrive for flights on time, would be to refuse boarding to any traveller who arrives after a previously specified time, making exceptions only for certain well defined and specified cases. This could be reinforced by printing

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[18]House of Commons Committee on Transport (1989), p. 2.

[19]Yeffet and Barnes (1989), p. 136.

latest check-in times beside, or even in place of, departure times on carriers' passenger timetables, because to both passengers and security teams it is knowledge of the former time which is of far greater practical importance. Alternatively, where some security activities are carried out by airport-related staff (as in the United Kingdom), the issue could be devolved away from airlines, with security officers being obliged to close their posts a few minutes prior to take-off.

While none of these options would be expected to be popular with an aviation industry obsessed with minimising "no show" passengers through such iniquitous practices as deliberate and considerable over-booking of passengers, the effectiveness of security must be given priority over the profit factor and any short term considerations of public relations. If it were to be adopted as an element of widespread security reform and if explained clearly to the travelling public, even such reductions in convenience could be made tolerable.

Another vexing problem, and one presented to British security managers after the sabotage of Pan Am Flight 103, concerns the entirely misguided and irresponsible instruction issued by the Department of Transport that "[any] item about which the searcher is unable to satisfy himself must, if it is to be carried in the aircraft, be consigned to the aircraft hold".[20] This piece of advice, while based on the reasonable premise that the possibility of constructing explosive devices on board an aircraft should be denied to terrorists, openly conflicts with the wider interests of security in granting a major and unnecessary concession to those of facilitation and customer services. Instead of transferring an unidentifiable and possibly explosive device or component from the passenger cabin to the equally vulnerable depressurised hold, its owner should be made to prove its innocence or else be required to give it up into the custody of the airport until such time as it can be retrieved or transported to its intended destination by land or sea.

It has been suggested above that security and facilitation activities can and should revolve around the same central aim of safe and efficient handling of flight departures. The stress which has been placed upon the conflicts which can arise between the two functions should not conceal the ability which undoubtedly exists for full cooperation with and involvement in security activities by staff whose principal role may lie completely outwith them. No special security or detection skills are needed to observe passenger, staff and baggage movements around an airport, but these simple techniques can provide valuable evidence of an intended security breach. If, however, facilitation staff are to view security as a matter for them rather than for a separate organisation they must be encouraged to be alert and must be rewarded for their diligence. Examples of cases being left for many minutes completely unattended at airports by security experts and journalists have caused concern with airport managers and even political embarrassment for government ministers.[21]

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[20] House of Commons Committee on Transport (1989), p.9.

[21] *ITN, News at Ten,* Monday 11 December 1989.

If a system were to be instituted by which reports of unaccompanied baggage or suspicious behaviour could lead to the reporting staff member receiving a reward, security might become a greater priority in the minds of personnel. More radically, reports of security weaknesses or irregularities could be encouraged in a similar way, as in situations in which airside staff could receive a sizeable "bounty" payment for every unauthorised person found on the ramp without a valid security pass. In such ways, the staffing gap which can exist between security and facilitation activities might start to be bridged, integrating the two elements into the same formula.

7.4. Human Activity and Technology in an Expanding Aviation Market

Plastic explosives, concealed detonators, non-metallic firearms, the intelligent use of airside infiltration processes by terrorist groups and the gross negligence of certain authorities, firms and individuals employed to prevent acts of air terrorism together illustrate the challenges and crises facing aviation security. The least complicated and apparently most attractive solutions which have been suggested for handling these problems are those which involve a return to visible, physical means of security - hand searches of all bags by intelligent, well-trained and well-motivated staff, detailed personal questioning of passengers and the limitations of passenger freedoms which have always been taken for granted in the setting of civil aviation.

Undoubtedly, there is much to be achieved by introducing certain advances which do not rely on technology, for any security system ultimately depends upon the calibre, ability and integrity of the staff operating it. It is equally important, however, to realise that in future, the development of airline travel globally will depend upon a constant reassessment of and improvement in the efficiency and capacities of each element within the security systems at airports, including those capacities of technological processes. This is the case because a return to a more physical approach would require operational conditions which would be inapplicable to the vast majority of airports and carriers under current conditions of market expansion.[22]

7.5. The Experience of El Al

In terms of passenger and baggage screening techniques it has been suggested that airlines and airports must progress in the direction taken by the carrier El Al through employment of labour intensive means of security[23] (in addition to technologically advanced screening methods) by which items of luggage are painstakingly searched by hand and passengers questioned in depth by well-trained staff to form an

[22] Brenchley (1986), p. 2.

[23] It has been estimated that the well staffed security points of the carrier take an average of approximately five minutes to clear each item of baggage encountered. *The German Tribune*, 22 January 1989, p. 14.

accurate profile of each traveller's character.[24] Although there is much to commend this policy to the airline which has used it so effectively,[25] it is proper to note that the carrier in question is only able to follow this protective course because of the unique nature of its flight operations.

The principal consideration which enables lengthy security activities for El Al is the fact of its Israeli identity, requiring constant vigilance against extremist attack from any of the state's many governmental and sub-state enemies. As most of the carrier's passengers travel to or from Tel Aviv, the airline can depend upon its clientelle being aware of the unusually severe political dangers faced by the state of Israel, in turn guaranteeing that El Al can impose stringent and time-consuming security measures upon its travelling public. Indeed, many passengers elect to fly with the airline specifically on account of its high reputation for careful security screening and because of its record of preventing attack. As Wilkinson has observed:

> " ... El Al's high reputation for passenger safety and security is a positive attraction for its customers, hence its extremely high load factor on the important trans-Atlantic route."[26]

Another benefit which El Al enjoys stems from its operational centralisation in Tel Aviv's Ben Gurion airport, which acts as the airline's only major hub.[27] As activities are centred in Israel this permits ease of cooperation with public security agencies. Indeed, the carrier's major stockholder is the Israeli Government. Close administrative and resource links with Israeli authorities allow for unparalleled state support and for intelligence information easily to be fed into the airline's advanced security system. Externally, El Al is doggedly independent to the point of being insular in its dealings with other branches of the aviation industry, its timetables advertising no transfer flights. This is the case despite the carrier's modest global operations - it employs no more than approximately 3,500 persons worldwide.[28] Low reliance on other airlines, however, allows for clear and definite lines of responsibility and independence of action in the field of security.[29] Also, the provision of direct, transfer-free travel involving never more than two transit stops keeps the airline's operations simple, to

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[24] *New Scientist,* 7 January 1989, p. 23; *Condé Nast Traveler,* March 1989, p. 36.

[25] McWhinney (1987), pp. 81 - 82.

[26] Wilkinson (1989) IV, p. 15.

[27] At Ben Gurion airport also, security is given an unusually high priority, with over 25 per cent of its gross budget being spent on security charges.MacKenzie-Orr (1988), p. 5.

[28] *Flight International,* 1 April 1989, p. 83.

[29] G. Lipman, *Megatrends in Aviation,* seminar paper (unpublished) presented at University of Aberdeen, 26 January 1989.

the benefit of security control.

Perhaps the most important consideration enabling El Al to carry out its dedicated forms of screening concern the nature of the airline's flights themselves. Examination of its schedules reveals that the airline flies from its airport base in Tel Aviv to only 33 destinations, with no routings to Asian, South American, Oceanic or Pacific points and with only two ports of call in sub-Saharan Africa.[30] This contrasts with British Airways' direct coverage of 131 airports worldwide from its centre at London Heathrow, with many additional services from other British sites.[31]

As a small international carrier with only around twenty aircraft in its fleet,[32] with few destinations to service and with an absolute reliance on simple, linear routes, El Al can afford to station its own elite teams of security personnel at any departure point, where detailed screening can take place and from where the security staff can easily return to their Tel Aviv base. Another routing benefit which aids the carrier in its security policy is the considerable preponderance of medium and long-haul flights on its schedules. Of the carrier's 33 destinations from the Tel Aviv departure point, only four lie within a two hour flight radius, the average flight duration being as much as five-and-a-half hours.[33] As a result of this, its passengers do not normally resent the lengthy check-in time required of them, because, with its average two-and-a-half hour check-in allocation or even its more rare four hour period, the overall journey time is increased by only a moderately low proportion.

El Al runs a very small number of flights per week, with only 69 departures from Tel Aviv in that period. Unlike some of its larger rivals, it is not in danger of over-extending its security capacity with an unrealistically high number of flights to process by overworked and undertrained staff. Instead, it could - if it were deemed necessary or desirable - expand its schedules without undue concern for the quality of its screening processes. It is worth noting that, currently, the airline's highly limited timetable of departures easily allows it to work according to what amounts to a six day week, imposed to satisfy orthodox Jewish proponents of sabbatarian doctrines.

In terms of El Al's passenger screening, the most important statistic to note is the number of occasions on which the airline makes embarkations of passengers because, while the security of aircraft arriving or stopping in transit can involve important security considerations, only embarkations involve the full array of screening procedures. The El Al timetable reveals that, worldwide, the airline need only screen passengers on 170 occasions per week - a tiny figure

[30] El Al, *Winter Timetable 1989/90*, pp. 1 - 9.

[31] British Airways, *Worldwide Timetable, 29 October 1989 to 24 March 1990*, pp. 136 - 161.

[32] *Flight International*, 1 April 1989, p. 83.

[33] El Al, *Winter Timetable, 1989/90, pp. 1 - 9.*

which signifies that the airline is under no time or work pressures on its worldwide screening schedules. This information is presented in Table 7.2. below, which illustrates the compact nature of El Al's international operations.

Once more it is useful to contrast this figure with that of a large airline. While El Al facilitates (weekly and on a global basis) 170 departures involving embarkation of passengers, British Airways processes 229 such flights from one small airport (Glasgow) alone, in the same time period. At larger, higher risk sites, the pressure on security staff of major carriers is still greater. Over any given week, many large airlines process more security-screened flights from a single airport than El Al processes from all of its departure points combined.

Additionally, of El Al's 34 airports of departure, 29 never have more than one passenger-embarking flight per day. Only Tel Aviv, Elat, New York, Brussels and London witness multiple El Al take-offs on certain days, and even then the workload is kept well within manageable limits. Overall, as many as 22 of the airline's 34 airports of departure have only one to three El Al departures per week, confirming suspicions that the carrier is unlikely to suffer greatly from passenger congestion in its security activities. Because of these factors, security teams can focus their attention on a specific potential terrorist target without being concerned that the next flight's passengers will soon be appearing at the screening point.

It should be clear that El Al is an unique airline, working under conditions and according to criteria which are not found anywhere else in the aviation industry. Security comparisons between it and any major airline offering a broader range of flights from more airports cannot, therefore, be entirely valid. Its emphasis on detailed profiling of passengers and its painstaking preparation prior to take-off may only be tolerated by many passengers because they perceive that the carrier and the routes being flown by it are under a constant threat of violent attack. Its ability to take time over screening and to employ highly motivated and able staff may be envied by some airlines' security managers, hard pressed to win a sympathetic and enthusiastic ear from time and profit oriented directors. Nevertheless, as Wilkinson astutely observed, even El Al's security strategy cannot be regarded as foolproof in every imaginable case of sophisticated terrorist attack:

> "[D]espite considerable success the security measures on El Al flights cannot totally suffice. As we have seen, the terrorists simply switch their methods of attack to the most vulnerable points."[34]

For some situations it is true that emulations by other carriers and by airports of the best of El Al's unique methods could be beneficial as short term emergency measures at large airports or even as standard features at smaller, less crowded sites where due need could be demonstrated. In emergency situations, certain of its tactics are, in fact, often implemented. For example, at times of crisis for

[34]Wilkinson (1986), p. 254.

aviation security it is not uncommon for an airline's flights to be delayed or rescheduled, and for passengers to be asked to check in for their flights earlier than advertised, in order that more detailed search and questioning procedures can be undertaken by security teams. In general terms, however, there can be little scope for any broad, systemic adoption of El Al's techniques into a growing aviation market.

The new dynamics of aviation in the next century will require accepted security standards of even the less well prepared members of the industry to give way to changing conditions of pressure, the result of which may be for second rate, rigid security routines to be overtaken by chaotic disorganisation. With the expected expansion of passenger throughput in the next decade and with new airports being increasingly difficult to locate near centres of large scale urban growth there will be almost unimaginable strains placed on many existing airports and carriers to transfer passengers from terminals into aircraft and thence to the sky. The accelerating surge of passenger pressure will make it unrealistic and practically impossible for El Al's slow and steady methods to be adopted as common procedures because the time factor involved would result in unconscionable levels of terminal congestion. In any case, the considerable expense involved in training and employing high calibre security staff and of using traditional, labour-intensive means of searching endears El Al's methods to few of its competitors.[35]

For as long as the industry's directors insist on cramming more flights into their schedules and hiring semi-skilled labour to give the appearance of security activity to the travelling public, El Al's approach will continue to be inapplicable to the aviation market in general. Its detailed philosophy cannot glibly be mouthed with conviction by carriers which are neither prepared nor able to adopt its central tenets. The lack of security consciousness and the blind commitment to expansion on the part of most airlines has forced Wilkinson to conclude:

> " [F]or the vast majority of the world's airports and airlines the only feasible way to improved security is the design of an aviation security system which does not slow down the progress of the passenger through the controls."[36]

As airports increasingly become congested in future, this aim may require to be modified to permit passenger transit without unreasonable delay. Irrespective of the precise effects of future growth trends, it could hardly be more obvious that El Al's strong and attractive approach to security will not be generalisable, unless a much needed but improbable *volte-face* takes place in managerial attitudes to security and growth.

An additional and important factor in ruling out the processes from meaningful consideration involves the economic implications of the measures for airlines offering a large range of short-haul routes. At

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[35]Wilson (1989), p. 16.

[36]Wilkinson (1989) IV, p. 15.

present, the benefits of taking a short, one hour flight as opposed, for example, to a five hour train journey, are obvious, particularly in an open aviation marketplace in which fares are increasingly being priced competitively. If, however, passengers were forced to check in for such a flight two or more hours in advance, were subjected to detailed security interrogation and routine physical searching and were also burdened with the added expense of increased security labour costs, the advantages of cheaper, unencumbered, direct rail transport from one city centre to another might become more apparent to travellers, leaving airlines to count the cost of decreasing demand for their services. Ultimately, short haul flights would become "in principle pointless."[37]

It would be commercially unviable to introduce these siege tactics across the whole aviation sector of an otherwise unaffected transport market and, moreover, its imposition would very likely be deeply resented by passengers and the industry alike, causing the inconvenience which terrorists delight in and disrupting the operation of the transportation market. Nevertheless, El Al's incomparable and constant experience of terrorist threat must mean that its example is one worth emulating wherever genuinely possible. As the British House of Commons Transport Select Committee observed in 1989:

> "The size and complexity of the operation at some of our larger airports, and the enormous numbers of passengers and bags passing through, especially at peak times, means that it would be impracticable to increase all security levels to El Al standards. There simply is not the space to accommodate the necessary equipment and screening facilities nor the time to give each individual very close personal attention by security staff. However, we believe that in future even greater attention must be paid to the need for some airlines, and for other airlines flying specific routes which are considered at risk, to implement higher levels of security than is normal. Airport operators must make space available to meet such security requirements."[38]

Instead of indicating specific examples of security activity for other airlines and for airports to adopt in total, El Al's experience of high threat security activity should demonstrate to the industry the significance of broader truths. First, the airline recognises that the principle that sufficient security is an overriding factor in its corporate operations - an imperative which should never be compromised. Its dedication to security cannot be doubted, because of the emphasis which is placed on the importance of screening by the directors and managers who oversee the systems used.

Second, El Al has determined that in the presence of publicly perceived terrorist dangers, passengers both respect and positively demand necessary security. As has been noted, the airline's ability to meet public demand rests in large measure on its unusual market activity. Nevertheless, assuming (for the moment) that security

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[37]Georg Fongern, spokesman of the pilot's association, "Cockpit", quoted in *The German Tribune*, 22 January 1989, p. 14.

[38]House of Commons Committee on Transport (1989), p. 1.

standards can be improved in the broader aviation marketplace, it follows that the industry as a whole could adopt a more positive opinion of security.

Third, El Al sets a vital example to other carriers in its recognition that outstanding staff capabilities, in addition to security technology or techniques, are central to success and progress in the struggle against violent aviation crime. Although El Al's actual practice may not easily be accommodated into the screening regimes of competitors, the above-noted underlying principles of security could be adopted with ease.

An incidental point worth noting at this point concerns one major weakness suffered (in common with many airlines) by El Al through its adoption of a proudly independent security identity. Dudley has alluded to two examples in 1970 of El Al's commendable vigilance which failed to prevent acts of aviation terrorism on account of the carrier's reluctance to act against threatening objects and persons. The first of these took place in February 1970, when an explosive item of mail was deemed to be suspect by El Al staff but was merely refused passage and diverted to another airline. Then, in September of the same year, two men were refused access to an El Al flight at Amsterdam airport because staff found them to be suspicious. However, rather than delivering the men to Dutch Police or invalidating their tickets, staff simply turned them away from the gate. As a result, the passengers (actually members of the PFLP) transferred flights and used their tickets to board a Pan American aircraft which they hijacked to Beirut and Cairo.[39] Such incidents should act as warnings to airlines of the dangers of adopting insular security policies and should motivate them to cooperate on an internal level to foil security breach attempts.

In place of the long delays and airport congestion which El Al's security would undoubtedly entail if adopted in total, resort must be made by the industry to those means of upgrading security which combine effectiveness with swiftness of operation. The dilemma for policy makers is that no effective combination of techniques has yet been demonstrated beyond reasonable doubt, currently to be both affordable and available to meet a wide range of requirements.

While the aviation industry advances to meet the new century and its challenges of dauntingly large passenger flows, little directional guidance has been given to the future of security and to what its priorities must be. Primarily it is evident that practicable security advances must in future rely upon the twin criteria which were together adopted when the introduction of security technology was made in the early 1970s - adequate screening coupled with passenger convenience. If airports, carriers and travellers are to submit willingly to the reforms required by passenger growth and new terrorist tactics, the point of most obvious delays must remain "at the ticket counter rather than at the search barrier."[40]

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[39] Dudley (1976 - 77), pp. 68 - 70 and p. 84.

[40] Wilkinson (1986), p. 252.

TABLE 7.2.

EL AL EMBARKATION POINTS AS AT 4/1/90

EMBARKATION POINT	FLIGHT	ROUTE	DAYS
AMSTERDAM (AMS)	330	AMS - ETH - TLV	2
	338	AMS - TLV	4 7
ATHENS (ATH)	542	ATH - TLV	2 45
BOSTON (BOS)	204	BOS - YUL - TLV	3
BRUSSELS (BRU)	312	MAN - BRU - TLV	1
	334	BRU - TLV	5 7
	336	BRU - ETH	1
BUCHAREST (BUH)	572	BUH - TLV	2 4
BUDAPEST (BUD)	368	BUD - TLV	2
CAIRO (CAI)	444	CAI - TLV	2 4 67
CHICAGO (CHI)	206	CHI - YUL - TLV	1
COLOGNE (CGN)	354	CGN - MUC - TLV	3
COPENHAGEN (CPH)	376	STO - CPH - TLV	1 3
	378	CPH - TLV	4 7
ELAT (ETH)	319	ETH - LON	1
	335	ETH - BRU	1
	337	ETH - TLV - AMS	2
	355	ETH - TLV - FRA	2
FRANKFURT (FRA)	356	FRA - ETH - TLV	2
	358	FRA - TLV	1 34 67
GENEVA (GVA)	312	MAN - GVA - TLV	4
	346	GVA - TLV	2
ISTANBUL (IST)	582	IST - TLV	2 5
JOHANNESBURG (JNB)	512	JNB - NBO - TLV	6
LISBON (LIS)	392	LIS - MRS - TLV	3
LONDON (LON)	015	TLV - LON - NYC	2
	016	NYC - LON - TLV	3
	310	LON - ETH	1
	316	LON - TLV	1234 7
	318	LON - TLV	4 6
LOS ANGELES (LAX)	208	LAX - NYC - TLV	1 3
MADRID (MAD)	396	MAD - TLV	1 4
MANCHESTER (MAN)	312	MAN - BRU - TLV	1
	312	MAN - GVA - TLV	4

| | | |

	391	TLV - MRS - LIS	3
	395	TLV - MAD	1 4
	443	TLV - CAI	2 4 67
	511	TLV - NBO - JNB	4
	541	TLV - ATH	2 45
	563	TLV - WAW	2
	571	TLV - BUH	1 3
	581	TLV - IST	2 5
TORONTO (YYZ)	010	YYZ - YUL - TLV	1 3
VIENNA (VIE)	364	VIE - TLV	3 5 7
WARSAW (WAW)	564	WAW - TLV	2
ZURICH (ZRH)	348	ZRH - TLV	12 45 7

Key to transit airport code emphasis

*** = Passengers embarking and disembarking

*** = Passengers disembarking but not embarking

*** = Passengers embarking but not disembarking

*** = Passengers neither embarking nor disembarking

7.6. Restrictions in Carriage

The enormous passenger growth which is predicted within the aviation market may place burdens upon airports' security points which require more than simply technological solutions. An accompanying pressure for the industry will stem from the increased amount of baggage and cabin items which will require to be screened prior to boarding aircraft and the expansion in the number of vulnerable transfer bags - a category of items not previously considered necessary to screen in most situations. Furthermore, if passengers in future become forced into queueing at hold baggage security points in order to have their large cases inspected or screened, it might reasonably be predicted that travellers would be tempted to bring a lower proportion of hold baggage, and bring instead more hand items, again placing undesirable pressure on carry-on baggage screening points.

Limitations on the number, dimensions, volume, mass and/or contents of passengers' bags may prove necessary, at least until efficient versions of TNA and other advanced technologies can be introduced, in order to accelerate and improve the performance of existing screening processes. Part of the mounting difficulty being faced currently flows from the aim of carriers to satisfy passengers' demands to carry as hand baggage bigger items than would have been permitted in previous decades. Similarly, previously strict rules specifying a maximum of one item of hand baggage per person have largely been allowed to lapse in recent years, causing a capacity problem for carriers which has been described by one airline executive as having

"grown out of hand".[41]

Screening articles - and particularly transit and transfer baggage - in tight schedules will become even more difficult in future, perhaps making it necessary for some forms of limitation to be imposed. Also, the worldwide proliferation in recent years of small, and thus portable, audio-cassette, radio, compact disc, television, video and computer equipment will make detailed and accurate screening of passengers' possessions virtually impossible until advanced technology can be introduced. The great sophistication of the radio-cassette bomb found in the PFLP-GC safe house in West Germany has already been noted, and should act as a constant and practical reminder that items which are difficult to screen are now also prime candidates for employment as devices for sabotage attempts.

Existing tactics for determining the nature of items which cannot easily be screened are unspeakably primitive, involving, for example, merely the exposure of a frame of film within a camera or the activation of a cassette player. The crude rationale behind such tests is that if the mechanisms contained in the items are able to operate, then there can be little doubt that they are safe. Recent cases of terrorist igenuity have proved the pointlessness of these measures. Nezar Hindawi's working pocket calculator which contained his bomb's initiating charge for the El Al sabotage attempt in 1986 was designed to trick security guards into thinking that the device was legitimate and beyond suspicion. That it successfully passed British Airports Authority security personnel, demonstrates how easily elimentary mistakes can be made and prompts the idea that manufacturers of electrical goods should be encouraged clearly to label products with accurate metricated weights (excluding power batteries and "add-on" components) to assist screening staff operating in emergency conditions.

Because of the upsurge in new threats posed by complex weapons technology, the failure of existing techniques, the inability physically to take apart and inspect thousands of electrical devices per flight and the lack of new screening apparatus with the capacity to isolate compact bombs, an emergency stop-gap measure is required. Although no-one in the industry and no passenger relishes the prospect of having to enforce or having to submit to carriage limitations, such a course of action would seem reasonable, both in terms of restricting terrorists' abilities to stow explosives in safe locations and in terms of raising throughput efficiency in a growing market.

In February 1989, British Secretary of State for Transport, Paul Channon made clear to a special ICAO ministerial meeting in Montreal that some new form of restriction should be imposed:

> "We need to ask ourselves, do we not, whether these devices should be carried on aircraft? ... Should we at least no longer allow them in checked baggage? Should we not at least require them to be presented at the check-in, perhaps for conveyance in

[41]Letter received by Geoffrey Lipman, July 1987.

the least vulnerable part of the aircraft?"[42]

It is interesting that the British Government's eventual decision on this question was to reject reform proposals and opt for the *status quo*, contrary to Channon's pronouncements. In April 1989 (in response to a Parliamentary question from Robert Litherland) Peter Bottomley, the Parliamentary Secretary for Transport, remarked that banning portable electrical goods would not be a practical way of improving security.[43] In fact, the opposite view could be argued, that until new and workable security methods are advanced, the only practical way of improving security in this field is to impose some form of restriction on carriage. Bottomley's reply rings only of a government unable to find electorally palatable solutions to difficult problems, and one which is unwilling to impose regulations which might be viewed by the industry and the travelling public as being unpopular in the short term. In respect of this point, it is perhaps significant that most airlines' major purchasing group for full-price tickets comprises business travellers, who might comprise the category of passenger most likely to be angered by the imposition of baggage restrictions.[44]

One month after the written reply was made, Channon was reported as having informed airports and carriers that electronic devices taken on board aircraft would from then require closer examination.[45] How this was to be implemented in any worthwhile sense without congesting airport security points was not noted, further suggesting that a face-saving compromise had been adopted which could serve only to show the public that the British Government was conscious of the crisis to be tackled, though unwilling to take steps to resolve it.

Airlines of at least six European states were found by the current writer to be employing some form of restriction in 1989, either by number of bags permitted or by volume of container, while those of many other nations continued to allow freer movement of items.[46] It is clear that the imposition of restrictions should be agreed upon and imposed in unison by the industry in order that passengers might be able to expect uniformity in their travels. The current piecemeal approach breeds uncertainty and does not offer a fair norm system to the passengers it affects. The difficulties which unregulated rule-making could cause in this area are not difficult to imagine. It would be unfortunate, for example, for a passenger to be allowed to carry a computer out of one country but unable to convey it on to a transfer aircraft at a foreign airport. One simple means of reducing the risks of inconveniencing passengers with new and unexpected measures would be to print on flight tickets accurate details of

[42] *The International Herald Tribune*, Tuesday 21 February 1989 (photocopy).

[43] *The Independent*, 26 April 1989 (photocopy).

[44] *Flight International*, 25 February 1989, pp. 6 - 7.

[45] *Flight International*, 6 May 1989, p. 12.

[46] Private investigations undertaken by the current writer, 1989.

national measures required by authorities of states in which the carrier in question lands flights. In recent years the Italian carrier Alitalia has included on its tickets information about Italian hand baggage number limitations, printed both in Italian and English.

Stricter regulation of the carriage of items which are difficult to screen by existing means, such as electrical, electronic and battery-operated goods and even such apparently innocent articles as cakes and confectionery, would not be unfair as a necessary protective measure for passengers. Additionally, it is foreseeable that certain ameliorating steps could be taken to soften the impact of imposed restrictions. One such step could involve the industry actually attempting to accommodate travellers' desires to carry such objects. For example, if passengers were offered the option of intimating to authorities an intention to carry electrical or electronic articles, then they could be instructed to arrive well in advance for detailed physical inspection of the items to take place. Alternatively, carriers might invest in a selection of the most popular devices in question, such as lap-top computers and mobile telephones, which could be hired or lent to passengers who had previously expressed an interest in using them during their flight or visit.[47]

It is correct to concede that any enforced limitation of passengers' baggage contents would be very difficult to achieve. Any effort to speed facilitation by imposing restrictions could easily rebound on authorities faced with queues of irate passengers questioning security staff about the details of regulations being imposed. British restrictions on hand baggage for flights between Great Britain and Northern Ireland were imposed at one stage but were eventually withdrawn, having been found to be difficult to administer and enforce.[48] If, however, such limitations were to represent an important and unique way by which aviation could be made safer for the travelling public, they should once again be given serious consideration by the industry.

A totally unrelated aspect of the problem encountered in restricting carriage of unidentifiable goods is to be found in discussion of the transportation of diplomatic bags. International law is clear that no obligation exists on the part of a carrier to convey any unexamined item protected by diplomatic protocol. The matter is laid out in the seven paragraphs of Article 27 of the Vienna Convention on Diplomatic Relations, 1961,[49] which does not specify that diplomatic bags should be subject to conditions of carriage different to those of ordinary

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[47] Wilkinson, *Memorandum* to International Foundation of Airline Passengers Associations, unpublished, 1989.

[48] Information received from British aviation security expert, September 1989.

[49] Vienna Convention on Diplomatic Relations, 18 April 1961, Vienna. 500 UNTS 95; UKTS 19 (1965), Cmnd 2565; 23 UST 3227; TIAS 7502; ATS 3(1968); JOF 17 Apr 71; 1971 RTAF 32; 55 AJIL 1064; 1 Ind JIL 508; 32 CNIA 23; 98 JDF 711; Brownlie I 212. Entered into force on 24 April 1964.

baggage or cargo. The provision of greatest interest is to be found in paragraph 3, which states:

> "The diplomatic bag shall not be opened or detained."[50]

This provision has been the issue of some debate among international lawyers, although certain states, including the United Kingdom, maintain that screening is, in principle, acceptable.[51] Farhangi has suggested that a degree of examination has generally been viewed as being reasonable, at least by the receiving state:

> "Some states argue that this article excludes the electronic scanning of a bag as a form of constructive opening. The Convention arguably stops short of according "inviolability" to the bag as negotiators at the Convention, fully conscious of the dangers of abuse, did not intend to exclude external examination by equipment or dogs as some kind of safeguard for the receiving state."[52]

A receiving state is powerless to return a suspect diplomatic bag to its sending state.[53] This norm, however, cannot be made to apply to airlines expected to carry diplomatic bags, because no obligation to carry unscreened bags exists. As a result, diplomatic bags can be treated by airlines as being items presented by conventional travellers and can be rejected if requests to screen them are refused. A problem facing a state which seeks to control the passage of arms and explosives to and from its territory in diplomatic bags concerns the continuing willingness of some carriers to permit unrestricted carriage without inspection. Hence, after the 1984 Libyan Peoples' Bureau shooting in London,[54] the inability of British authorities to screen diplomatic bags, one of which probably contained the weapon used to kill WPC Yvonne Fletcher,[55] may have been compounded by the readiness of an airline to allow free passage of all diplomatic baggage to Libya.

Although there is no evidence of diplomatic bags having been used by unscrupulous governments to conceal explosive devices designed to be used against civilian airliners, the prospect is not unimaginable and should certainly be foreclosed by security teams. The Italian Government recognised in 1986 the serious risks which exist and opted

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[50] Vienna Convention on Diplomatic Relations, 1961, Article 27(3).

[51] R. Higgins, "The Abuse of Diplomatic Privileges and Immunities: Recent United Kingdom Experience," *American Journal of International Law* 79 (1985), p. 647.

[52] L.S. Farhangi, "Insuring Against Abuse of Diplomatic Immunity," *Stanford Law Review* 38 (1986), pp. 1534 - 1535.

[53] *Ibid.*, p. 1535.

[54] *The Times*, Wednesday 18 April 1984, p. 1.

[55] M. Griffin, "Diplomatic Impunity," *Student Lawyer*, October 1984, p. 22.

to subject diplomatic bags to security screening prior to boarding.[56] IFAPA has campaigned for other states to follow a similar course.[57]

7.7. Considerations of Aircraft in Security Enhancement

The vulnerability of aircraft on the ramp at airports has been demonstrated in the many incidents of terrorist infiltration which have taken place prior to take-off (discussed above). In future, security should be built into aircraft, so that no easy means of access is available to intruders and none of the currently large range of hiding places exists for the placement of arms and explosives on board. This will be a major task, the scope of which cannot easily be contemplated. It is hoped that aircraft manufacturers will realise that security is a feature worthy of inclusion in design plans from the earliest stages and that security design engineers will be employed to present imaginative ideas on improving aircraft in this vital respect. Improving upon aircraft design was an issue which was discussed at an ICAO special ministerial meeting in February 1990, with a proposal that potential hiding places be eradicated receiving widespread support.[58]

For the present, the industry has indicated that it is unwilling to spend the many millions of dollars necessary to "harden" existing aircraft in carriers' fleets, as, for example, by reinforcing baggage holds such that an explosion might have reduced risks of total in-flight destruction. Instead, many security specialists believe that investment would be much better placed in developing better screening equipment and in improving upon future aircraft designs.[59] This practical consideration is one which should be respected, provided that efforts are made to improve upon designs in future and that work takes place in the short term to remove easily identifiable weaknesses.[60] In 1986, one major US aircraft manufacturer announced that, following passenger surveys, it had decided to incorporate new features in models under development to enhance passenger safety and

[56] Press release from IFAPA, 20 September 1986.

[57] *Plane Facts*, June/July 1986, p. 2. Note that strong evidence exists to suggest that at least one state sponsor of terrorist groups allowed plastic explosives to be conveyed in its diplomatic bags prior to and in connection with the Pan Am Flight 103 incident. *The Guardian*, Wednesday 10 October 1990, p. 1.

[58] *Flight International*, 25 February 1989, pp. 6 - 7.

[59] Opinion received from US aviation security expert, September 1989. See a Boeing spokesman's comment in *Security Management Today*, November 1990, p. 47.

[60] The FAA is currently investigating means by which cargo containers can be strengthened to withstand a bomb blast. McGuire (1989), p. 7. British investigations into the hardening of aircraft have also been undertaken since the Lockerbie incident, with the Department of Transport examining possibilities in conjunction with an ICAO study group on the matter. Press release from the Department of Transport, September 1990.

comfort.[61] If aircraft corporations were to regard security as an equally important planning priority, useful enhancement could more reasonably be expected.[62]

It cannot be stressed sufficiently often that protection of airport ramp areas must be achieved through the imposition of a strong landside/airside boundary. In addition to this factor, aircraft themselves must be made more secure than has previously been the case for most carriers, if threats from saboteurs and hijackers are to be minimised. The absence of even conventional locks on many types of civil airliners' doors is indicative of the misplaced trust which the industry has always had that its aircraft must be safe by dint of airport security alone. The ability of journalists to gain unauthorised entry to aircraft merely by opening entry hatches or climbing through wheel housings into passenger cabins above has emphasised the true vulnerability of these valuable and important vehicles.

Extraordinary aircraft protection on the ramp can be achieved by employing security staff to stand guard over airliners which have been cleared as security sterile after servicing crews have worked on them. Alternatively, perimeter defence systems using microwave or laser technology can be placed in a cordon around sensitive aircraft. In this way an invisible boundary can be established which, if breached, will notify a central security point of illicit activity without alerting the intruder that detection has taken place.

An element of aircraft protection which could be useful in dealing with hijackings concerns the use of televisual devices to monitor activities on board flights. In 1985, a British firm, Contemporary Systems Design, commenced development of a pinhole-camera technique which can relay images to a control unit receiver placed within the line of sight of the aircraft at a range of up to one kilometre. By 1987, its Covert Aircraft Surveillance System, known as Medusa, was being marketed as a method "designed to provide Law Enforcement Agencies and Special Forces with real time intelligence during aircraft hijack/hostages situations." The broad surveillance offered by Medusa's microwave video technology derives from its ability to use up to eight cameras and microphones per aircraft, with signal security being guaranteed by frequency encryption. One of its greatest strengths is its control unit's compact dimensions, a television screen, video recorder and software keypad fitting into a single attaché case.[63] Costing £20,000 per unit for a Boeing 737, the Medusa system is well suited to installation in fleets subject to a high risk of hijacking.[64]

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[61] *Plane Facts*, September/October 1986, p. 1.

[62] Note that the UK Air Accident Investigation Branch recommended in 1990 that aircraft hardening should be widely introduced. *Security Management Today*, November 1990, p. 47.

[63] Publicity material for Contemporary Systems Design, 1987.

[64] *The Observer*, 18 July 1987, p. 6.

Another monitoring system, produced by US company Saysen costs £40,000 per Boeing 747 but allows images to be relayed on the aircraft's radio frequency, enabling monitoring to take place anywhere. Also, the company's Chairman, Tony Crabb, has claimed that remote control piloting of flights could be achieved with the method and that useful forms of deception are possible, such as fuel gauge alteration, to imply that fuel levels were low.[65]

7.8. Other Areas of Concern

7.8.1. Cargo and Mail

In addition to the consideration given above to the needs of passenger security at airports, some other side issues have a direct influence on travellers' safety in flight. For example, the danger posed by unscreened cargo consignments was illustrated on 2 May 1986 when an explosion killed many on board an Air Lanka aircraft. It is believed that the device was loaded with vegetables so that it would evade all security checks established for the flight.[66] Since the time of that incident, it has been far from clear that standards have improved at all on most civilian services.

If security levels are not to be allowed to fall to unacceptable levels, airports should centralise deliveries by instituting cargo, goods, mail and services transfer points where consignments can be accepted, documented and be made subject to the possibility - if not the likelihood - of a security search. Already, advanced X-ray and chemiluminescence systems exist for the purpose of screening large objects, such as cargo consignments, and methods based on mass spectrometry and neutron bombardment might also be applicable to the task.[67]

It is essential that increased protection be given to unaccompanied objects carried on civilian airliners, if only because it is a target waiting to be attacked by terrorists' explosive devices. In 1988, London Heathrow processed 600,000 tons of cargo, while the airport was used by some 600 freight agents, with, it seems, only El Al using cargo screening techniques on a regular basis.[68] It is not sufficient merely to require clear documentation and a trustworthy record of carriage, because patient terrorists can provide these, given time. Equally, the selective use of 24 hour shipping delays to provide a statistical possibility of confounding time bombs is now hopelessly outdated and should not be regarded as a sufficient guard against

[65] *The Observer*, 18 July 1987, p. 6; *The Times*, Thursday 22 March 1990, p. 13.

[66] *Discover*, June 1986, p. 30.

[67] Information received in 1990 from a senior executive of an international aviation organisation raises doubts about the current qualities of existing cargo screening equipment. It seems that much more research and development will be required to produce a sufficiently advanced cargo screener.

[68] *Condé Nast Traveler*, March 1989, p. 40.

terrorism. Instead, the distinct possibility of advanced screening being carried out would provide a workable starting point for guarding against terrorist infiltration into cargo, mail courier services and aircraft supplies of bombs and firearms.

In respect of mail consignments on board aircraft, the possibility of terrorists using postal services should never be overlooked. The 1970 Austrian Airlines sabotage case was found to have centred on a piece of mail (containing a radio bomb) sent from Munich to a fictitious character alleged to have been living in Jerusalem. If doubts exist concerning the ability of airlines to intercept mail bombs, it should be remembered that the item - along with another which destroyed a Swiss Air Convair 30A on the same day - had first been presented to El Al for carriage but had been refused entry.[69]

Equally, restricted crossing points should utilise security screening procedures for workers, aircraft crew and their baggage, to minimise risks posed by deliberate or unknowing carriage to the airside of weaponry and explosives. Although the trouble and expense involved in instituting rigorous screening for such activities might discourage action by aviation authorities, an obvious weakness urgently requires to be addressed if access control is to become a shield rather than a sieve.[70]

7.8.2. Simulation Chambers

The employment of skilled staff, advanced screening technology and sophisticated techniques would assist many airports in the struggle to keep pace with terrorist threats. Notwithstanding these factors, however, situations will probably continue to arise in which further actions might be deemed useful, as where intelligence data indicates a specific threat from a particular passenger's hold baggage or where positive results have been received from screening articles which cannot easily be manually searched (such as electronic items and diplomatic bags). In such circumstances it is the prerogative of the carrier to reject any article which cannot adequately be cleared - inconvenient though that may be for all concerned.

Alternatively, innocence can be at least partially verified and so confidence gained by using flight simulation techniques to trigger any explosive devices which may be present in baggage. The most basic and inadequate of these techniques, though one which is still employed by certain members of the aviation industry, is to keep the bag stored in a secure venue for the duration of the flight. In this way, if any timing device has been activated prior to check-in, it will run its course and detonate in, for example, an outlying hut, rather than in the hold of an aircraft. Alternatively, if the article passes the delay test it will be regarded wrongly as having proved its benign nature and be placed on the next available flight. It need hardly be said that so passive a response to terrorist threats ill serves the contemporary needs of the aviation community.

[69] Dudley (1976 - 77), pp. 68 - 70.

[70] Wallis, Beaumont Memorial Lecture, 1989.

Decompression simulation has long been recognised as a useful addition to the simple delaying tactic. Its employment is intended to overcome the ever-present dangers of barometric triggers by reducing air pressure to a level at which the targeted aircraft would be expected to fly. Dorey has discussed at length the required specifications for decompression chambers.[71]

In future, much more sophisticated simulation chambers will be required, as terrorists' capacity to create novel triggering devices is pushed outwards. ECAC has recommended storing suspect articles as well as exposing them to low pressure (and to high pressure if the destination altitude was lower than the departure altitude); to simulated flight noise; to high frequency fields; to radiation; and to acceleration.[72] In this way triggers relying on pressure variations, engine sound, radio signals, radiation screening and take-off acceleration would be interrogated by the simulator. In addition, temperature differences could be noted in flight simulations.

The capital and running costs of a comprehensive simulator chamber would perhaps be viewed as being excessively high for all but the most affluent of authorities. Despite its unique defensive capabilities it is unlikely that it would be introduced on a large scale. Instead, simple and inadequate methods will be more likely to be used or else simulation will be ignored, with suspect bags being rejected, made subject to controlled explosions or simply carried at risk.

7.9. Airport Design Features

With regard to facilitating improvements in aviation security many of the most difficult problems to be encountered involve the very design of airports themselves. The problems involved are twofold: first, public access buildings which contain openly displayed symbols of different nations' airlines necessarily present a potentially vulnerable target for airport attackers; second, terminals which are designed with ease of access in mind can also provide hijackers and saboteurs with possible routes to aircraft.[73]

Open plan terminals incorporating freely available social amenities, a large number and variety of doorways, glass panelling onto the ramp, mixed access areas for arriving and departing passengers and unrestricted movement throughout much of the terminal have been standard features in some of the most important of airports constructed before the advent of aviation violence, when speedy facilitation was the industry's only major planning concern.[74] These common and familiar characteristics, however, make airports more

[71] Dorey (1983), pp. 240 - 2.

[72] ECAC (1988), section 3.

[73] McWhinney (1987), p. 119.

[74] MacKenzie-Orr (1988), p. 5. It has been established that bomb explosions in non-shatter-proof glass-constructed airports create more human casualties from glass fragments than from the bombs themselves. Norton (1987), p. 32.

difficult to keep secure from the dangers of arms transfers, armed attack and sabotage.[75] Hence, instead of being discouraged from attempting violence at such venues, terrorists intent on airport attack are offered the benefits of access and a large, physically unprotected target area with sufficient publicly accessible vantage points from which to strike. It would be wrong to suggest that this vulnerability inevitably causes widespread passenger concern because, as Gallenschutz has observed, a different perception can exist as between the industry and its users on the environmental priorities of airports:

> "Airport personnel understand that security measures are essential, and are prepared to tolerate a certain amount of delay and inconvenience, and possibly a prison atmosphere of locks and bars, because they appreciate that the systems are installed partly for their own protection.
>
> The travelling public, on the other hand, likes to feel that the airport terminal is a place where they are welcome and comfortable. Airport designers and architects try to respond by creating an ambience and decor which is friendly, and the elimination of antagonising security hardware is to be encouraged. Likewise a lower profile for security personnel is desirable, both for the lessening of public tension and for the straightforward economic advantage of reducing operating overheads."[76]

Architectural and design features in the majority of the world's terminals have always been geared towards passenger comfort and convenience, the enterprise of highly profitable retail outlets and the operational needs of user airlines. As a result, requirements for adequate security have classically been overridden by important considerations of organisation and commerce. For example, most airports which are designed to enable the rapid entrance, transfer and exit of passengers, meeters, greeters and other visitors incorporate as one of their key features ease of movement throughout public areas.

Such a freedom provides a means by which terrorists may gain access to the very heart of the airport without being made to disclose their identity. Also, airports which allow shopping franchises to operate in their passenger terminals thereby present terrorists with potential hiding places for explosive devices or weapons. This compromise on potentially high standards of security can provide a considerable asset for the terrorist by weakening the structural defences possible at airports, so facilitating not merely opportunities for initiating hijackings and acts of aircraft sabotage, but also for attacking the airports themselves and their users.

A commercial difficulty for airport operators who must contend with restricting the scope of terrorists to attack their sites concerns the fact that most airports rely on franchises and concession sites for a large proportion of their revenue. Because this aspect of their

[75] Dudley (1976 - 77), p. 71; J.W. Wegstapel, in Mendes de Leon and Zwann (eds.) (1987), p. 100.

[76] Gallenschutz (1988), p. 243.

business is so lucrative, most airports are keen to make their terminals easily accessible, exciting and visually attractive places for travellers and others to visit, in the hope that money will be spent by those who pass through them. Unfortunately, æsthetically pleasing architecture and commercially oriented activities can militate against optimal security efficiency.

The legacy of weaknesses handed down to the present age by these older, vulnerable terminals is problematic in the context of airport engineering, as the vast - perhaps in many cases prohibitive - expense of redesigning airports to meet new requirements and the practical complications and inconvenience entailed in executing the plans, constrain efforts at radical reform. For these reasons, airports rarely undergo a security-motivated refitting to introduce less vulnerable structures. Instead, a limited degree of risk control can often be achieved by resort to the introduction of non-structural security elements. Reinforced and monitored peripheral fencing, illumination and televisual surveillance of exposed or vulnerable areas and an adequate and constant police or military presence at high risk points reduce dangers for vulnerable airports in a cost effective, though incomplete way. Even simple factors, including the design and location of airport fittings and furniture and the nurturing of passenger awareness of security issues can play a vital, if discreet, role.

In airports constructed in future, security features could more readily be accommodated in the planning and construction stages by, for example, keeping the number of terminal doorways to a reasonably low number to permit a steady flow of persons and allow swift emergency exit, yet also enabling monitoring of all human traffic from the passengers' first point of contact with the airport. Airports must also be prevented from becoming junctions for the transfer of guns and explosives by keeping incoming and outgoing travellers separate in their transit through terminals and by minimising the number of potential arms drop-off/pick-up points within them. Structural features such as separate departure and arrival terminals with clearly enforced one-way transit routes would allow greater confidence that "security sterile" zones had been established in which screened and unscreened passengers could not mix. Failing that, absolute physical obstruction between exiting and entering channels would provide a reasonable alternative.

7.9.1. Location of Security Points

In making the important decision concerning the most suitable location for security screening points within terminals, an unavoidable calculation involving factors of risk, commerce, cost and feasibility must be made. In the case of existing airports which do not exhibit high security consciousness in their original design, the interplay of these factors may result in policy makers deciding against wholesale reorganisation, because of the expense, inconvenience and difficulty entailed in introducing new security into old layouts. Instead, an inappropriate, commercially oriented measure is usually adopted. The measure in question involves locating security screening zones in close proximity to departure gates. In its favour, it should be noted that this can be a means of achieving complete security sterility for targeted aircraft, if screening points are located near to the latest point of contact between passengers and the terminal and provided that

security activities are carried out with diligence.

This screening policy allows freedom of movement throughout public areas such as entrance halls, shops and restaurants. At its best, this can present three benefits: first, as the security sterile zone is small, it should be easy to control and police, with high levels of security posing no problem of convenience to non-travellers; second, if each gate is equipped with its own security point, passenger flow can be kept at a casual and steady rate, with passengers able to elect when to enter the departure lounge screening zone; third, airports are able to continue operating publicly accessible and profitable franchises and services. Drawbacks of the system include its failure to guard against attacks upon vulnerable terminal targets, such as check-in desks and ticket counters in the unprotected landside areas. Also, practical staffing difficulties and expense can militate against such a proposal being comprehensively introduced at larger airports with many gates. Instead, fewer screening points are frequently used, servicing several flights simultaneously, thus adding to congestion difficulties at busy times.[77] Furthermore, as unmarshalled passengers are prone to arrive at a departure lounge very shortly before their presumed boarding time, clearance delays can very easily be caused with the best of systems.[78]

Some airport authorities realise the importance of high security in particularly vulnerable sites and take more stringent action to foreclose terrorists' inroads. For these very few authorities, issues of commerce are often ignored, as their prime concern is the safety of passengers - a commendable goal, though one which can involve high costs in several senses. Certain airport security specialists, including Dorey, maintain that the most vulnerble airports should transfer passengers safely from entrance halls immediately into security sterile zones, thus precluding any movement within the airport by unsearched individuals.[79] This policy requires the movement of all services (including toilets, lockers, shops, restaurants and bars) beyond security checkpoints to make them security sterile and so hopefully protected from the dangers of arms and explosives implantation.[80] In such a scenario, unticketed persons

[77] Interview with British airport design specialist John Loder, Paris, France, September 1989. IFAPA has commented that one means of overcoming peak time congestion in terminals would be to introduce "staggered" check-in times, by which economy class passengers would arrive for processing significantly earlier than first and business travellers. *Plane Facts*, June/July 1986, p. 2.

[78] D.Z. Abdul, *Aviation Security (Management Aspects): Malaysian Experience*. Unpublished paper presented at International Aviation Management Training Institute Conference on Aviation Law and its Impact on Management, Bali, Indonesia, 10 May 1990.

[79] F.C. Dorey, "Security at Airport Terminals," *Airport Technology International* (1988), p. 249. In such advanced airports as Changi, Singapore, X-ray and vapour detection screening takes place at the terminal entrance. Clutterbuck (1990) I, p. 186.

[80] *Newsweek*, 8 July 1985 (photocopy).

are either required to undergo identical screening procedures to those imposed on passengers or else are simply barred from entering the airport.

With public access requiring screening of all persons and their possessions, an unfortunately high workload is placed on security staff, whose job should not require their energies to be dissipated on the non-travelling public. At the largest airports, it is questionable that general screening could be accommodated without involving large scale inconvenience and expense. This option is undesirable, because of the organisational difficulties involved in screening so many travellers, staff, wellwishers and others, and because of the inevitably damaging economic effects which such a restriction would have on demand for services from non-travellers, many of whom could be expected to be discouraged from entering airports under such conditions.

Equally, the closing of airports to all but the travelling public inevitably raises serious commercial considerations.[81] The problems to be faced have been expertly described by Dorey:

> "In 1973, when I was chief security executive for Northern Ireland Airports, in an effort to control a difficult situation it was arranged for non-passengers to be excluded from the terminal building at Aldergrove Airport as one facet of a stringent security system. Every person was searched and every person was X-rayed at the main entrance door. In effect the whole airport had been converted into a security sterile area, but with devastating consequences upon the revenue previously earned from the concessionaires' trading activities."[82]

Where government funds are available to prop up an airport made subject to such a form of defence, public exclusion can take place, because little or no financial injury affects the airport in question. It is to be trusted that a general trend in this direction would never take place, because of the need for large-scale and perpetual public funding or else general increases in costs for the industry and its users. Rather, a means of securing airports from violent offenders should be sought which does not unduly inhibit airports' commercial activities. To satisfy these demands, a mechanism is required by which adequate security protection can be imposed within airports, while permitting the operation of franchises and concessions. Described below is one such security plan devised by Fred Dorey, which can be made to operate at various security levels, depending upon the nature of the threat faced.

After the Rome and Vienna airport attacks of December 1985, Dorey was contracted by the Swiss security firm of Kriton Security AG to assist in the development of a "door control" security system to be fitted into entrances of important but vulnerable buildings, such as banks. The aim of the system is to prevent the infiltration of firearms, explosives and other undesirable objects into the building by using

[81] R. Wallis in Mendes de Leon and Zwaan (eds.) (1987), p. 88.

[82] Dorey (1988), p. 249.

the twin-doored chamber idea, in conjunction with advanced security screening apparatus.

Dorey recognised that it would be unfeasible to use this technique on airports with many entrances and that practicalities of airport usage would often require modification of it, so that instead of placing the system at the first point of contact with the teminal, it could more realistically be located just before airlines' check-in areas. This policy has been implemented in the past by certain airport authorities, without employing high technology elements. For example, by placing check-in desks beyond security points, Saudi Arabia has afforded valuable protection to its three international airports.[83]

Using Kriton's methods just before the point of check-in, security throughput would be limited to passengers, rather than widened to cover all terminal entrants. Dorey has described the operation of the system thus:

> "The door system monitors all persons and their hold baggage, cabin articles and indeed anything carried by hand, on an automated and continuous basis. Each pair of doors has an X-ray machine sandwiched between them upon which all carried items are placed. The person entering the door is automatically momentarily detained while a check for the presence of explosives and volume of metal being carried is made. ... If nothing suspicious is found the exit door of the booth opens allowing the person into the check-in area.
>
> If suspicion is aroused the person is requested, by taped voice or flashing notice, to pass through a side door into a chamber. The recorded voice will instruct him to put all articles being carried in pockets, into the armoured security drawer for inspection by the security staff. The exit door may then be released or other action taken depending upon what has been placed in the drawer. Any attempt to leave weapons in the booth (on the floor or lodged in the ceiling) to be taken through by a following accomplice is negated by a synchronous self-checking of the door system prior to allowing entry to the next person."[84]

Using advanced X-ray technology a processing rate of ten to fifteen seconds per passenger is claimed by Dorey, allowing an hourly processing rate of approximately 240 persons with baggage.[85] At this rate, security screening for a wide-bodied aircraft could be facilitated within one hour by using two doorway systems. Profiteering airport authorities might be unwilling to adopt any measures which threaten to slow down throughput rates to as low as four passengers per minute, citing the everpresent "need" to maintain fast facilitation rates. Nevertheless, the doorway screening system might be regarded as an important option for security managers at high risk airports, because it combines a high level of automated, advanced

[83] Information received from Geoffrey Lipman, August 1987.

[84] Dorey (1988), p. 249.

[85] Dorey (1987).

technology with a particularly secure and resilient landside/airside boundary. If combined with more advanced screening technology its capacity for detection would increase, strengthening further screening abilities. Once integrated into an airport as a design feature of principal importance, Dorey's system could play a vital role.

Similar security criteria to those outlined above can be made to apply to the passage of passengers through airport terminals as was described above in relation to access control. Unmanned, automatic entrance and exit points can be installed at airports to promote uni-directional passage and prevent unwanted passenger regression. This is of particular use in seeking to prevent incomers entering a terminal via vulnerable exit points or to stop security screened passengers moving from airside to landside areas.

The myriad possibilities for terrorists and their accomplices to breach access control points can never fully be assessed. Nevertheless, as with the unlimited potential for in-service testing of security staff there are many ways in which the preparedness of airport facilities can be examined. Brenchley has remarked that the adoption of terrorist tactics can provide useful means of finding loopholes at airports:

> "Security authorities need to have their airport defences placed under independent examination. Ingeneous and resourceful pseudo-terrorists, perhaps from special sections of the armed forces, should be tasked to study the problem of breaching airport security and to seek, by a variety of methods and unknown to the airport staff, to get dummy bombs on to aircraft. The lessons learned from such exercises are invaluable. The more gaps that can be found, and rectified, the better. This is no area for false pride."[86]

7.9.2. A High Security Airport: An Integrated Scheme

A dilemma for airport designers and managers is encountered in determining how to mediate necessary terminal security and adequate public freedom. A strong case can be made for restricting the liberties of the innocent, who currently enjoy access to most airport terminals' services, in order to limit the excesses of the guilty, who seek to pervert those freedoms for their own illicit purposes. While the capacity undoubtedly exists for the tightest of security standards to be introduced at the public areas of terminals, it is equally valid to observe that any needless transformation of swiftly efficient airports into slow-moving fortress-like installations would in itself grant a large concession to the excesses of terrorist intimidation. Clearly, a line requires to be drawn such that security will suffice to prevent and deter terrorists' activities,[87] yet will leave airports able to function commercially.

[86] Brenchley (1986), p. 3.

[87] Although it should be remembered that in the absence of a unified, global approach to airport security enhancement, "deterrence" can only be expected to operate redistributively, passing air offenders from the stronger to the weaker sites. MacKenzie-Orr (1988), p. 5.

While passengers are now well aware of the possible risks posed by aviation terrorism, the industry is equally conscious of the consequences of unnecessary processing delays and of discouraging commercial activity at airports. It is submitted that airport designs incorporating high levels of security should not be dependent upon the availablity of high levels of state or passenger-financed support - simply because such support will not always be readily forthcoming. Below is discussed a possible solution to the problem of making all but the highest risk terminals commercially attractive venues which can also incorporate high security features by utilising better security processing designs. The proposed design scheme is intended to present features which could be adapted easily for new airports and might be able to be incorporated into some existing sites.[88]

As should be evident from the foregoing discussion, the aim of security-conscious airport designers should be to produce plans for airports which incorporate measures for the prevention or deterrence of the three principal types of aviation violence - hijacking, aircraft sabotage and airport attack - while taking account of commercial and practical necessities. Inevitably, a "systems approach" to the task is needed, in which consideration is given to all aspects of security from the design of passenger routes and implementation of advanced screening equipment to the construction and location of seating and litter bins. It is vital for a unified landside/airside boundary to be established and for monitoring posts to be viewed as being centrally important features in that zonal shield. Once detailed organisational features are combined with adequate screening measures operated by skilled personnel (both described above) a framework for hijacking and sabotage prevention should exist.

The problem of airport attack risk minimisation requires other skills for its solution because unless all entrants to airports are screened at their first point of contact with their terminal of entry, the landside/airside boundary will lie sufficiently well inside the building to ensure some degree of vulnerability. If measures are to be taken to discourage any offence, it is important to recognise the factors which motivate offenders to carry out their illegal acts. In this case, it is apparent from the targets chosen by airport attackers that a primary factor in their selection is often the national identity of airlines which locate their check-in and sales desks on the landside. Accordingly, if all such nationally identifiable targets were to be removed to the airside, one major target category would be protected.

With such security shielding, there would be a much lower incentive for terrorists to strike at landside areas, although prudence would still require the deployment in all public areas of adequate surveillance, of police and security patrols and of armed response teams in order to guard against the unexpected. It should be stressed that the removal of targets and the use of monitoring and response

[88]For an interesting discussion of airport design possibilities, see Clutterbuck (1990) I, pp. 184 - 191 and Clutterbuck (1990) II, pp. 148 - 150.

methods would themselves be likely to inhibit or deter attacks. The entire system is intended to provide an integrated approach to the control of all types of violent air crime.

On arrival at an airport terminal employing the above-mentioned system, members of the public would pass through a limited number of doorways into one entrance hall. Passengers would, at this point, be faced with two distinct routing options within the terminal entrance hall. One possibility would be for them to enter a landside services hall, offering free access to a variety of services. In place of the familiar desks and stands which normally meet travellers and terrorists alike on entering passenger terminals, services unrelated to any airline or nation would operate. Hence, it is suggested that public areas of airports should be devoted to the provision of shops, restaurants, bars, banks, galleries, lounges and other services which will encourage visitors to spend time and money there, whether waiting for departures or arriving passengers, or simply passing through for pleasure.

In this respect, the landside services hall would be in the airport, but not of it, offering a broad range of facilities of interest to the public, without presenting needless terrorist targets. The on-site purchase of airline tickets could be facilitated not through specific carriers' desks, but rather by creating one neutral travel agency counter, patrolled by guards and monitored by CCTV cameras linked to security headquarters. Similar security activities would be conducted at the other particularly sensitive area of the landside zone, the arrivals point, where meeters and greeters would await passengers from in-coming flights.

The other routing option for passengers arriving in the terminal hall, and one which would eventually require to be adopted by those in the landside services zone, would be to proceed to their departures. The first point of contact passengers would have with aviation related services would be at a security zone - operated by the airport authority, rather than by individual carriers. The zone might readily involve a variation of Dorey's doorway system, particularly if impressive processing rates could be obtained from it. Enclosing the security zone within an automated, blast and bullet-proof, double doorway system, monitored by armed state personnel would provide a powerful disincentive to attack.

Access to the security points within the zone would be gained only by passengers showing their tickets to security personnel at the first door, so as to limit the number of persons requiring screening to ticketed travellers. (Instead of specifying an earliest check-in time for travellers, tickets might display a latest screening time, beyond which access to aircraft would be impossible.) Once passengers were within the enclosure of the first (landside) doorway, each traveller would proceed to one of the several screening points lying within the zone. The sampling and analysis times of the various screening processes being used on passengers (such as metal and vapour detection) and their baggage (which might include advanced X-ray, TNA and other appropriate techniques) could be capitalised upon by staff simultaneously conducting ancillary tasks. For example, all travel-related documentation could be inspected by computer for suspicious indicators. Time would easily permit Wilkinson's airline travel pass idea to be incorporated as an important security feature here and the

processes could be accompanied by security staff undertaking profiling interviews.

A major advantage of carrying out hold baggage screening at this point would be that the owner would be present to open the case, explain its contents and answer further profiling questions if necessary. Once the screening had been carried out satisfactorally, baggage would be banded or, if soft or zipped, sealed in a tough polythene bag, to prevent subsequent additions being made to it by passengers or staff. Next, the second (airside) doorway would open for all passengers deemed to be safe, allowing progress from the security zone to take place. For passengers found to be in possession of dangerous substances or to be otherwise suspicious, the doorway system would prevent escape, necessitating his/her diversion to a separate side room for further investigation and possible arrest.

Each screened and cleared passenger would proceed to one of two facilitation zones, one for domestic passengers, the other for international travellers. The domestic zone would require passengers to check in for their internal flights and have their baggage sent to a central processing area. In the international zone, passengers would undergo state passport control and then check in for their departures and have all hold baggage dispatched. Because security checks would have been made prior to entry to the facilitation zones, no overt security activities or judgements would be required of check-in staff, although their casual observations of security risks might be channelled to security personnel. At the check-in areas, a computer-coded tag would be appended to each bag, cross-referenced to its owner's boarding pass, for ease of reconciliation, should boarding lists and baggage manifests ultimately fail to correspond with each other.

At the central baggage processing zone it would be vital to maintain a routinely high level of security, so as to guard against the channelling into the system of infiltrated unscreened baggage from external sources. If it was available and regarded as necessary, extra pallet screening equipment using neutron bombardment or similarly automated techniques, might be used to verify that baggage consignments were free from external influence immediately prior to loading into aircraft holds. The processing zone might also house a mobile screening unit employing, for example, advanced X-ray or chemiluminescence techniques and installed in a van or trailer, to make extraordinary screening visits to aircraft viewed as being of high risk. Such a capacity would be useful in dealing with emergency situations, such as credible bomb alerts and conditions in which fixed screening apparatus was malfunctioning or difficult to install.[89]

Having checked in at the terminal, passengers would be free to move within an airside services area. It would be essential to maintain the integrity of the landside/airside boundary, so the services located beyond the security point should be sufficient to meet the needs of travellers waiting for their (possibly delayed) departures without requiring to exit the sterile area. A broad and exciting

[89] Publicity material for AS&E, 1989; Publicity material for Astrophysics, 1990.

range of services would encourage departing passengers to spend money (for the benefit of the airport's finances) and might also promote early arrival at the initial security point, thus militating against the worst effects of security congestion.

Once an impending departure had been announced, the passengers of the flight in question would move to the specified departure lounge. The time spent there, waiting for permission to board, could be occupied by conducting further security interviews, advance immigration checks or screening activities, if required, with the possibility of slower-operating apparatus (such as current chemiluminescence devices) being used at leisure. This would similarly be a suitable point at which the airline involved could join the security activities, if it wished so to do. As the initial security check would have been rigorous, it is foreseeable that only the most security-conscious carriers would wish to call their flights sufficiently early so as to enable further detailed surveys. In all cases, boarding passes would be read by on-site computer terminals and comparisons made with baggage data similarly received from handlers loading the flight's aircraft baggage pallets. In this way, baggage discrepancies could efficiently be dealt with well in advance of departure times.

This system would not be capable of any effectiveness unless accompanied by measures designed to deal with high risk transfer and transit flights. With passengers transferring or in transit from an aircraft originating from a low security airport, it might be deemed necessary or desirable to subject them and their baggage to the same quality of screening as described above. A separate transfer security screening point would be used in such cases, featuring similar measures to those outlined previously. This screening point would feed directly into the terminal's facilitation zone, where transfer desks would await passengers and their baggage. Passengers arriving from airports deemed to have a high standard of security operations might be permitted to pass directly to the facilitation zone, their baggage being channelled to the processing area. For a transit stop involving a short grounding, it might be more economical and convenient to process passengers into a separate, airside lounge, provided that it could be guarded adequately and that additional screening was not judged to be necessary in the broader interests of security. Otherwise, transit flights would simply be accorded the same treatment as transfers.

Finally, it would be necessary to introduce centralised cargo, courier, mail and supplies depots which would also act as landside/airside transfer points for staff with access to sensitive areas. Using one depot for processing and screening all departing and transferring consignments and another for receiving arrivals would act in a similar way to the streaming of passengers into two distinct flows. The depots' on-site security screening points might not be able to handle all traffic (in the form of airside workers, their equipment, vehicles, supplies and cargo) passing through them, but they could at least implement spot checks on a proportion of persons, cargo and supplies passing through (discussed above). Obviously, security would be intensified with the adoption of a high screening proportion and made less reliable with a low proportion.

It might be possible to introduce such a system operated with considerable dependence upon computer control. At least one

interesting computerised security and facilitation system has been proposed to date.[90] The difficulties, expense and risks associated with such reliance should not be underestimated, however. In particular, it seems likely that an airport which used a central bank of computers to control its passenger operations would be a prime target for terrorist attack. Unimaginable havoc could follow the destruction of databases which controlled the automatic handling of baggage, the processing of passengers' flight information and other vital activities. Equally, unnecessary reliance on electronic technology leaves any user vulnerable to an accidental shut-down of a system. In the case of security activities, such accidents could provide terrorists with opportunities to breach fallen defences and attack sensitive targets.

Diagrammatic representations of the proposed security system as it relates to passengers and members of the public, and hold baggage, cargo, supplies and services, follow. See below for:

TABLE 7.3.

PASSENGER ROUTES THROUGH HIGH SECURITY AIRPORT

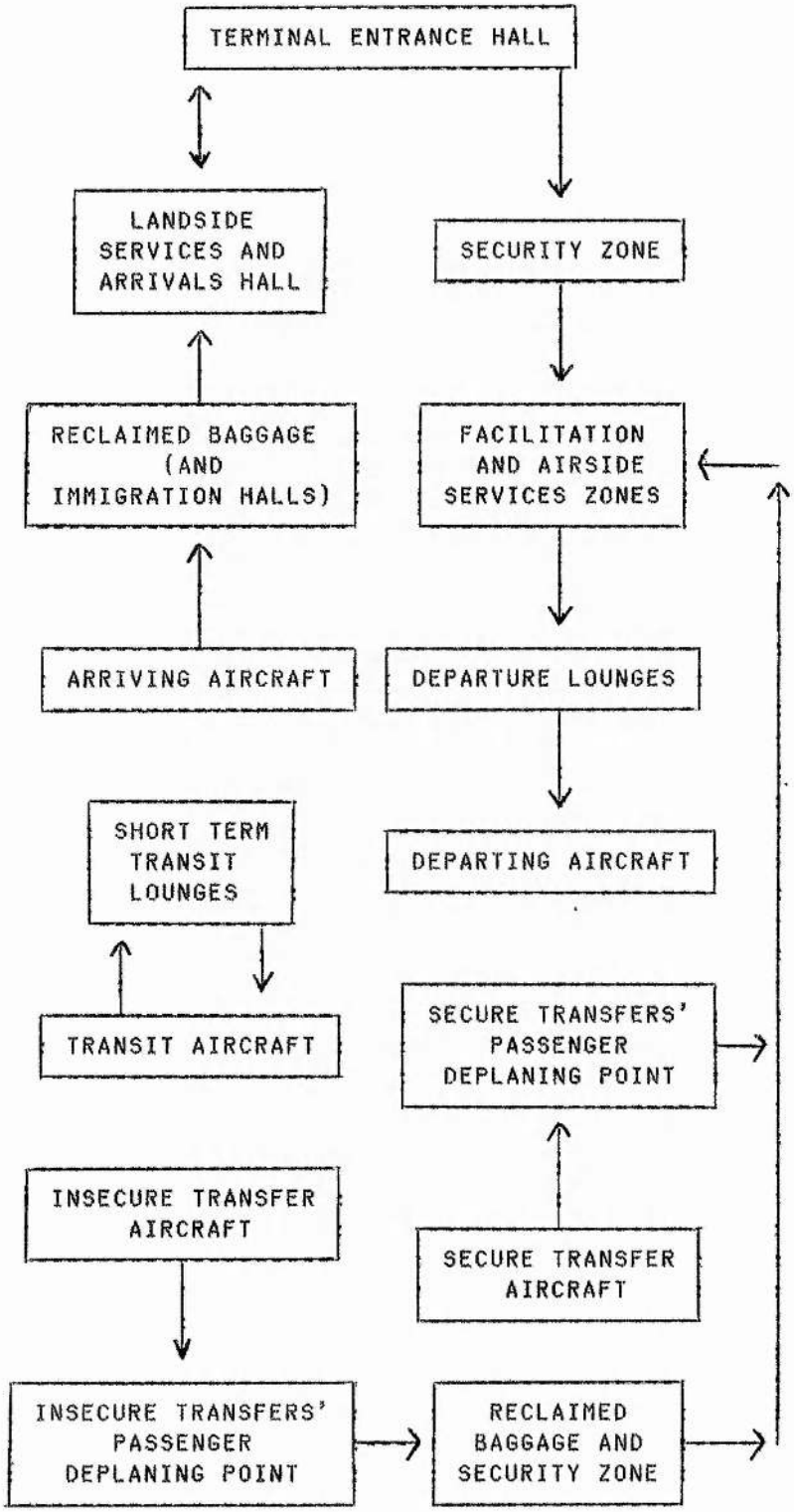
and

TABLE 7.4.

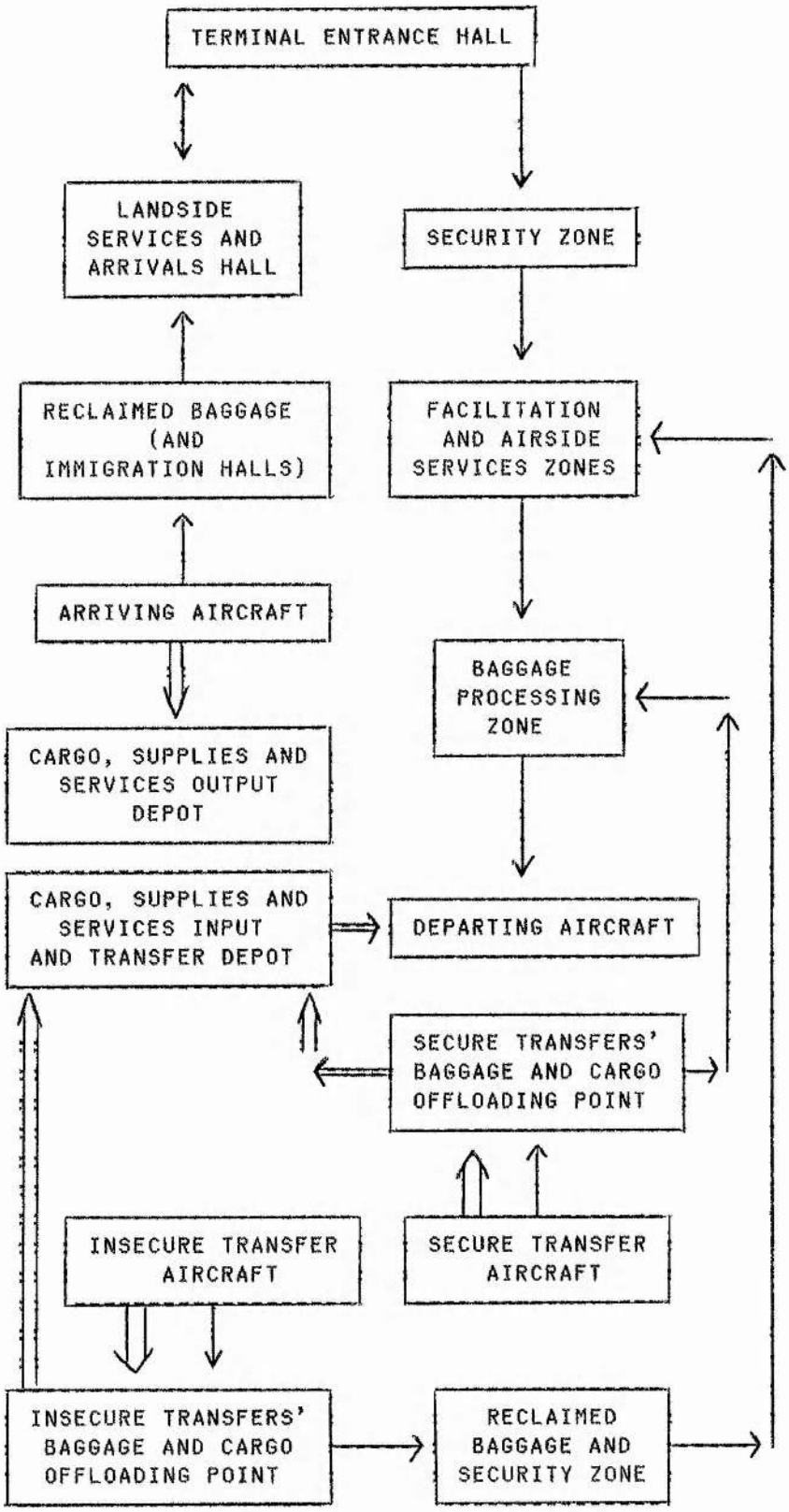
BAGGAGE, CARGO, SUPPLIES AND SERVICES ROUTES THROUGH HIGH SECURITY AIRPORT

[90]Boyle (1989), p. 188 - 190.

Key: → = Passenger route



Key: → = Baggage routes
⇒ = Cargo, supplies and/or services routes



Ultimately, the principal security aim of airport designers in the future must be to rate the requirements of security at least as highly as those of commerce and convenience, adopting a broad portfolio of techniques (some elementary and cheap, others more complex and expensive) in order to foreclose resourceful terrorists' options. It is vital that this capacity should be linked with the potential to expand and adapt existing processes when required and to combine them with new techniques and abilities as they become available. In particular, it should be remembered that any system which is at first adequate but which eventually proves inflexible can expect only short term success.

7.10. Conclusion

There are several identifiable causes of the security crisis facing the aviation industry in the 1990s. One major factor is that of technology, with terrorist capacities easily enabling advanced explosive devices to be infiltrated past obsolescent security systems. If the evolving threats of terrorist organisations are to be contained with any degree of confidence in future, governments must consider carefully the need for increasing investment in promising research and development projects. In time, the introduction of a multi-faceted screening system designed to isolate a range of potentially threatening substances and objects should be sought at major airports. For other sites, economical, automated vapour detection systems should be marketed and incorporated into security portfolios employing advanced X-ray, metal detection and - wherever possible - neutron technologies. It must be stressed that not every airline and airport in the world would be able to enhance its security to even acceptable standards in the near future, not least because of financial stringencies. For the same reason, few would be able to impose structures such as those described immediately above. Nevertheless, international action is required if terrorist threats are to be removed from the sizeable sector of the industry currently devoid of meaningful protection.

Another factor which must be given serious attention is the development of economic conditions in which flight activities have been permitted to expand in advance even of limited security capacities. It is inevitable that any private corporation will be motivated by profit maximisation and loss minimisation, but this should never be permitted to override vital interests involving high cost expenditure, such as safety and security in the aviation industry. It may be impossible to reverse the industry's trend towards offering more passengers a greater number of flights. It would certainly be difficult to persuade many carriers to spend significantly more time, money and effort on screening passengers and items bound for their aircraft. Hence, where logic and persuasion might fail, the imposition of regulatory structures and assistance packages might more readily be expected to succeed.

Attention must turn to means by which airlines and airports can be assisted in raising their security standards and means by which authorities might best oversee and regulate security activities. A prime consideration, to be dealt with in the following Chapter, involves the global administrative difficulties which must be considered in any discussion of industry regulation. To safeguard standards, and thus to protect the public interest, governments should

be encouraged to become more directly concerned with the administration of security activities.

CHAPTER 8

COORDINATING THE FUTURE DEVELOPMENT OF AIRPORT SECURITY

> "The sad truth is that our governments lack the political will to set aviation security high on the international agenda. And even if they find the will, they lack a clear strategy and machinery to coordinate the effective international action that is required."[1]

> "Q. In December 1988, was the security operation of Pan Am in Frankfurt on any heightened state?"

> "A. We followed the security procedures set up by the FAA."[2]

8.1. Introduction

This Chapter outlines some requirements for standardisation of state and industry responses to the changing needs of aviation security. As the threat of terrorism is faced globally, the case is presented for the international community turning to cooperation in the reappraisal and improvement of aviation security, with the aim of better deterring potential offenders. The implementation of reform proposals on a global scale would inevitably require wholesale reorganisation of activities, relatively much greater capital investment and higher security operating costs. A vital element in the Chapter's structure is, therefore, the discussion of a strategic scheme to finance the administration of such measures, the key component of which being a one dollar (US) per flight security levy on airline ticket prices. The Chapter concludes with the observation that as terrorists will become ever more capable of disrupting the aviation community, difficult decisions must be taken swiftly in order to find practical financial and organisational solutions to airports' practical problems.

8.2. National Aviation Security

Before any examination of international cooperative efforts can be undertaken, it is necessary to stress that in a world comprising sovereign states which guard their petty insularities as well as their legitimate national interests, effective cooperation can only hope to be built upon the firm foundations of national strength. Wilkinson

[1] P. Wilkinson, *Interavia Aerospace Review*, 7 (1989), p. 689.

[2] Testimony of Pan American World Airways employee, M. Huebner before US President's Commission on Aviation Security and Terrorism, 1990. President's Commission (1990), p. 9.

has drawn attention to the self-imposed isolationism which is the key characteristic of the problem involved:

> "The basis of any improvement in global aviation security must be the enhancement and proven effectiveness of our national security systems. There is no adequate machinery of global order and law enforcement, and no international organisation yet capable of establishing such, which can be looked to as an alternative means of imposing a radical enhancement in aviation security. ... In the absence of any such integration we must look to enhanced national systems for improving our aviation security, and to improved bilateral collaboration with friends and allies as the most practicable and normal means of international action."[3]

The first prerequisite for establishing an effective national system for security must be a properly administered security programme designed to set out a clear hierarchy of responsibilities for agencies involved in the activities and to regulate security functions in such a way as all bodies concerned can know with certainty what contribution is expected from them into the overall structure being imposed. The creation of such programmes should force governments to come to terms with the problems which require to be addressed and should prompt them to reassess the true nature of their existing security capabilities. As an extract from the opening paragraph of the ECAC security manual puts it:

> "Each Member State should designate an appropriate authority within its administration to be responsible for the development, implementation and maintenance of a national aviation security programme. Each Member State should provide adequate legal powers and other appropriate means to ensure the implementation of its national aviation security programme. The objective of the programme should be to protect passengers, aircrew, ground personnel and the general public from acts of unlawful interference with civil aviation."[4]

Without a clear-sighted domestic policy on security administration, it is evident that overlapping competence and gaps in responsibility can each lead to negligence developing and ultimately to crucial mistakes being made. Such elementary muddles may appear trivial, yet the US Presidential Commission investigating security organisation in the United States was left in no doubt that it required urgent attention by US authorities.[5] For example, in terms of intelligence, more efficient dissemination procedures within US and UK administrations and throughout the industry sectors which they are supposed to regulate might have resulted in warnings concerning the Pan Am Flight 103 disaster having been treated more seriously when received. In any case, the poorly delineated tiers of authority failed to facilitate the passing of vital intelligence materials to agencies which might

[3] Wilkinson (1989) II, pp. 1 - 2.

[4] ECAC (1988), paragraph 1.1.1.

[5] See the Commission's recommendations. President's Commission (1990), pp. 121 - 125.

have used them to great effect, suggesting either that the national aviation security programmes of the states involved could have been more explicit in their designation of roles for such scenarios or that existing provisions were being implemented inadequately.[6]

In its report of 1990, the US President's Commission made clear that there is a constant danger of poorly drafted national regulations being used by the industry to conceal its security weaknesses. Lacking complete clarity in wording, standards can easily permit serious loopholes to develop which, in turn, can be filled with convenient and discretionary activities not directed towards the enhancement of security.[7] As any regulated industry should be expected to act "according to the rule book" which is intended to govern it, it is imperative that "the rule book" should provide minimal scope for potentially dangerous discretion which might later both allow lapses in vigilance to take place and exculpate bodies responsible for such lapses.

A good example of the problems involved is to be found in the sub-contracting of security firms and the hiring of screening personnel in the United States. As with other aspects of aviation security policy, the employment of so-called security staff is left firmly within the jurisdiction of the industry in many states. This reliance on the *laissez faire* approach to employment management presents considerable dangers, because commercial considerations can easily push employers towards the lower end of the labour market. It is easy to imagine that carriers would be governed by a fear of civil litigation following instances of insecurity leading to acts of aviation crime. Dudley has noted that Article 20 (1) of the Warsaw Convention can provide a defence for airlines able to prove that due care had genuinely been taken prior to boarding:

> "It is worth restating that this is the defence that the carrier and his agents took every necessary measure to avoid the damage or that it was impossible to take such measures. Obviously as hijacking has developed and become a steadily more serious risk so the onus would have been increasingly on the carrier to show that he had taken reasonable precautions to protect passengers and this may include forms of preventative security."[8]

Unfortunately, American evidence from Yeffet (quoted immediately below) suggests that as the risk of air crime has increased, carriers have not been motivated to enhance security by, for example, employing a higher calibre of staff. Far from capitalising on this, it appears that prospective litigants have been precluded from raising court actions by the nature of the US Federal regulatory system. Lack of supervision by US authorities in the way in which American security

[6] *Ibid.*, pp. 69 - 82.

[7] *Ibid.*, p. ii.

[8] Dudley (1976 - 77), p. 83.

staff are employed prompted Yeffet to comment that it is often the least well-qualified candidates who are hired:

> "In effect, the FAA has told the airlines that they are responsible for their own security. This not only allows the FAA to avoid responsibility for security failures, it allows airlines to ignore their responsibility. The Warsaw convention limits their liability for security failures, as long as FAA procedures are followed. The result is that American airlines have made security a low priority. This can be seen in their choice of security companies. Virtually all American airlines hire firms based solely on the lowest price. The result: private security firms hire personnel who would be [virtually] unemployable in any other industry."[9]

The FAA's reluctance to provide detailed guidance to the industry on the precision with which its norms on staff qualities and other issues must be observed has led to the standards being abused. Yeffet commented in another source as follows:

> "As it stands now, American carriers use FAA regulations as a bastion against lawsuits after they fail to prevent disasters. They tell juries listening to the complaints of bereaved families that they had adequate security - they met FAA standards."[10]

It should be obvious that this form of reliance upon regulations is both contrary to their true purpose and a needless legal loophole by which the industry can evade liability. On an issue as basic as staff recruitment, a high standard of conduct must be expected from airports, carriers and sub-contracted firms. If self-regulation is inadequate to ensure that job applicants reach a sufficient level of excellence for security work, it must be for national authorities to impose high standards which require positive action, rather than low or non-existent standards which allow objective responsibilities to be ignored. A similar suggestion for the UK airport security employment market was endorsed by the British House of Commons Transport Select Committee in 1989.[11]

Finally, with respect to national activity, governments must learn fully to cooperate with carriers and airports in introducing new security systems and structures. In particular, agreement should be sought with the industry that responsibilities for security activities should increasingly pass from airlines to less commercially competitive bodies, such as police departments, airport authorities or special publicly established units. In this way, greater personnel efficiency might be encouraged, costs might be shared equitably, expense saved and potentially unhealthy free market influences kept at

[9] Yeffet (1989), p. 2.

[10] Yeffet and Barnes (1989), p. 137.

[11] House of Commons Committee on Transport (1989), p. 1.

bay.[12]

8.3. Bilateral and Regional Security Agreements

The bilateral approach to problem solving is one which offers several exciting benefits for security, plus a number of severe limitations. It is certainly true that major powers could use their network of allies in the developing world to channel resources and expertise into airports. On the other hand, any such bilateral activity is bound to leave some unfavoured governments outwith its purview and is, in any case, unlikely to promote the necessary degree of global advancement which a broader, multilateral package might more easily facilitate. Although some major aviation powers, including the USA and Canada have offered bilateral assistance to developing nations, the resources available for such schemes have never been significant. More importantly, however, is the consideration which must be given to creating a security system on a global scale. Without detailed coordination efforts, upgrading can never lead to the development of fully integrated security systems.

ICAO has attempted to persuade its members to use the bilateral mode of agreement formulation to enhance security. An ICAO voluntary assistance programme on security operates on an ostensibly bilateral basis with the Organization merely monitoring and coordinating requests made by states in need of assistance and offers of support from donor countries. This arrangement allows requests for aid to be made directly to ICAO, which can forward them to possible donors or else assess the time scale in which support should be provided and decide whether or not to place the request on a priority list for urgent action, pending the availability of necessary funds.[13]

ICAO concern for bilateral activity also extends to coverage of security standardisation. On 25 June 1986, the Organization's Council urged all contracting States to insert into their bilateral agreements on air services a clause on aviation security.[14] This exhortation recognised that agreements which govern the terms and conditions upon which foreign civil air carriers may operate at airports are most often made on a bilateral basis. Accordingly, governments negotiating new air services agreements (and in particular those in a position of comparative economic strength, able to dictate contractual terms to others) could seek to introduce practical provisions with the express intention of raising security standards. In principle, the concept of bilateral security conditions in air services agreements is exciting, because of the ability of the major aviation powers to use the threat of service withdrawal as an incentive to other, possibly less diligent states to take security more seriously. In practice, however, this would be dependent upon the major states in question first recognising for themselves the security prerequisites which should be included in

[12] Suggestion proposed in a letter to Geoffrey Lipman from a US aviation security consultant, 18 February 1989.

[13] ICAO Working Paper A27-WP/64 EX/19 12/7/89, paragraph 6.2.

[14] For a discussion of bilateral air agreements and of their role with respect to security, see Gertler (1985), pp. 75 - 79.

agreements and then providing means of finance to bring about the changes sought. Also, meaningful action would require the larger powers to issue the threats in the first place, at risk of antagonising their contractual partners and forcing undesirable disagreements to emerge.

Instead of taking such stringent, threatening and potentially expensive action, states responded to the ICAO initiative by reducing it to a second-rate means of voicing support for the Organization's flawed standards. ICAO itself promulgated a model clause on security as a guide for states in their negotiations. The clause, however, only sets out a familiar list of vague or unimportant undertakings which have proved inadequate in the past to deal with the true dangers of terrorism.[15] States which jointly assent to the terms contained in the model clause agree to act in conformity with the provisions of the Tokyo, Hague and Montreal Conventions, provided that both countries are parties thereto. The clause covers the provision of "all necessary assistance" (unspecified) upon request of either party to prevent threats to the security of civil aviation and to terminate incidents. It also calls upon both parties and their aircraft operators to abide by all aviation security provisions contained in Annexes to the Chicago Convention (including Annex 17, which deals with security matters) without recognising that the Annexes themselves should first be upgraded and explicated, so as to make them worth enforcing in this way.[16] Predictably, however, it remains silent on such vital issues as the means by which necessary standards should be introduced, administered and financed fairly.

Clearly, the responsible use of more powerfully worded security clauses in bilateral air services agreements, in conjunction with necessary resource redistribution measures, could result in a broad network of practical cooperation evolving, the significance of which could be great in reinforcing tough security standards. Unfortunately, while nothing prevents states from extending the scope of the ICAO model clause, it is feared that the original, rather unimpressive model will simply be copied by states or modified only slightly as the basis for security agreements. This concern was intensified when, on 22 April 1986, US Deputy Secretary of State John Whitehead made the following comment in a statement before the House of Representatives Committee on Foreign Affairs:

> "Since January the Department has launched negotiations with some 80 of our bilateral aviation partners for the adoption of an improved aviation security article based on the ICAO model."[17]

While a more stringent version of ICAO's model clause would be useful

[15] Cheng has described the terms of the ICAO model clause as "rather tame". Cheng in Cheng and Brown (eds.) (1989), p. 50.

[16] ICAO Document LE 3/32-86/102, 26/11/86, pp. 26 - 28.

[17] J. Whitehead, *Counterterrorism Policy* (Washington D.C.: Department of State, 1986), p. 2. The US President's Commission was positive in its assessment of the capacities of bilateral agreements to promote security. President's Commission (1990), p. 37.

in efforts to improve security, bilateral activities of this type must always be restricted in their capacity to promote organised, coordinated advances. Regrettably, the experiences of the Summit Seven in attempting to give regional direction to firmly worded declarations leaves concern that genuine progress will be hard won even at the multilateral level. Nevertheless, while regional efforts to enforce the failing provisions of the Hague and Montreal Conventions may have resulted in little more than embarrassment for states involved, regional efforts can play a vital role in the practical suppression of terrorism. For example, high level intelligence-sharing between allies has led to greater understanding of terrorist groups' operations. Such fora as the European Communities' TREVI meetings should be supported by member states improving information pools and channels of communication.[18] Another means by which international cooperation within regions can prepare states to tackle terrorist incidents is through the introduction of procedures for the training and deployment of anti-terrorist units from ill-prepared allies. Also, after any incident of unlawful interference with aviation, communication should be undertaken between any affected states with investigations operating on a transnational level to determine the extent of security weaknesses presented and means of bringing about necessary improvements.[19]

In terms of security standardisation, regional bodies such as ECAC can enjoy a useful role as consultative fora in which ideologically and economically compatible state delegations (such as of the liberal, western European governments) can discuss complex questions of security administration and technology. Although ECAC has no powers of mandate over states on issues of security, it is clear that its ability to focus delegations' attention on difficult matters leads to high level understanding being reached by its like-minded members and may also serve to provide an otherwise unobtainable directional force to domestic security policy makers, so guiding the development of regional policies. In this sense, ECAC may be viewed as a regional equivalent of ICAO, though one which benefits from its members' political and economic similarities and from comprising a smaller number of members.

It would be wrong to suggest that ICAO could be expected to provide as high a quality of guidance and policy leadership to its diverse membership, for while its global remit offers benefits of universal application, it also diminishes prospects of strong, unambiguous decision-making and reduces the quality of argument and of informal understanding between the parties involved. Equally, regional bodies with predominantly consultative powers should not be regarded as being able to formulate hard policies for standardising security within their individual regions, let alone for the broader setting of universal norms. Hence, regional bodies cannot be trusted to provide for the type of integration required to bring about radical changes on a worldwide basis, while doubt must exist as to the capacities of ICAO to reach meaningful agreement on difficult security questions.

[18]Clutterbuck (1990) II, pp. 121 - 122.

[19]ICAO Document A26-WP/53 EX/12 26/8/86, p. 2, s. 1.9.

8.4. Reformulating And Standardising Security Through International Action

Although a strong case can be made for extending the scope of national regulation and limited (bilateral or regional) cooperation on issues of security, such activities alone cannot be expected to suffice on an all-encompassing global scale. There will always exist areas of concern which could benefit from being consigned to a standing global agency competent to standardise often disparate day-to-day working norms. A good example of the need which exists for integration of rules was presented to the US President's Commission by Timothy R. Thornton, Executive Vice President and General Counsel for Northwest Airlines:

> "We had a dispute with a foreign government that went on for six months, where we were out of compliance with the FAA mandate as it related to extraordinary X-ray security of all checked baggage. [The foreign government] told us not to do it and the federal government told us to do it. Sometimes we were in violation of American laws. Sometimes we were in violation of the foreign laws of the airport where we operated. We were in the middle."[20]

Merely hortatory standards and recommendations such as those contained in ICAO's Annex 17 and even in more detailed security manuals cannot be trusted because of their static nature and their almost total lack of international enforcement. Divergence of policies and complete regulatory voids can only be expected where states are not members of an overseeing and on-going structure of control. It is valid to point out the desperate need for increased universal cooperation which co-exists with the problem posed by states' refusal to admit their vulnerabilities in the field of airport security. This amounts to a paradox which will not easily be solved as it involves both a need to extend areas of agreement covering security and a long-held unwillingness on the part of states to cede their domestic powers to the international community of which they are members.

Aviation terrorism is nothing less than a universal problem from which no government can afford to hide, requiring to be addressed with directness and honesty. Governments' empty declarations and token palliatives may temporarily calm public concern for the crisis which continues to haunt the industry, yet they cannot overcome basic terrorist threats. Effectiveness in response must require the global problem of terrorism to be dealt with by global problem solving techniques, for the simple reason that the civil aviation community is a community of diverse membership in which the strong and the weak operate together in a competitive yet intertwined and interdependent context. Under such conditions the security mechanisms of each government, airport and carrier require to be viewed as necessary components of a security shield for the entire industry, which in turn can only ever be as strong as its point of least resistance. With international flights from every continent feeding into the world-wide organism of civil aviation, the time has now arrived when weaknesses at any point in its immune system can and do allow terrorists and

[20]President's Commission (1990), p. 32.

their weaponry to pass into it like a devastating virus. In order to control this free-roaming virus of terrorism and to make it less virulent, it will be necessary to suppress the crimes involved through dedicated global initiatives directed at offence prevention and offender deterrence.

A much needed qualitative leap in airports' security capacity could satisfy two urgent requirements for the global suppression of air violence. First, greater efficiency in the detection of potential offenders at security points would actively prevent terrorists from fulfilling their aims. Second, public demonstration of new capacities would force terrorists to reconsider the utility of targeting aviation and might thus divert many groups away from hijacking and sabotage. Even if nothing else could be achieved by such reforms, a regeneration of security capability would compel terrorists to revise their strategies while indicating to the travelling public that aviation authorities can and do act positively for the protection of passengers' safety.

The foregoing discussion suggests that advances in security must be implemented on a universal scale for adequate progress to be made against terrorism. Upgrading of richer and poorer nations' security capacities in tandem should not, however, be undertaken with the intention of achieving absolute uniformity of operations at every domestic and international site, for such would be economically unwise and, in any case, practically impossible. Without doubt, the unparalleled threats posed by plastic explosives and similarly advanced substances and devices force the concerned observer to conclude that modern means of detection should be employed wherever budgets permit and that steps should be taken to lower the threats posed by less well-secured sites as, for example, by limiting their capacity to accommodate high risk flights and wide-bodied aircraft.

Any globally formulated strategy should standardise different types of security operations for different types of threat faced, bearing in mind the diversity of airport operations undertaken throughout the world. Strategic action would require to be firmly underpinned by ensuring that certain minimal procedural safeguards would be adhered to at every location and that, wherever possible, notable security loopholes would be foreclosed to scheming terrorists. Such a course would not easily be undertaken as it would be bound to meet with a degree of opposition from governments and from the industry itself, with questions of state sovereignty, finance and organisation placing considerable difficulties in its path. Furthermore, the practical realities of poor security being endemic in airports of the economically developing world and at least prevalent in many of those of the so-called developed nations require to be regarded as major problems.

8.5. Airport Security in Less Developed Countries

In the interdependent world of civil aviation, the implications of a "north/south divide" in security capacity are indeed severe, particularly as terrorists have demonstrated their readiness to turn the inadequacies of the entire system to their best advantage. An example of this preparedness is to be found in the hijacking on 24 July 1987 of an Air Afrique DC-10 to Geneva's Cointrin Airport. The circumstances in which the lone Southern Lebanese hijacker, Hussein

Ali Mohammed Hariri, gained access to the aircraft with a firearm, ammunition and explosives may never be fully known or publicised. It is clear, however, that he boarded the flight in Central Africa, as the aircraft had departed only from Brazzaville, the Congo and Bangui, the Central African Republic, neither of which is renowned for its high security standards.

The task of securing airports in less developed nations is one which presents manifold resource and implementational problems in terms of airport infrastructure, technology, staff capacities and general management. It has even been noted that at some sites there may not be sufficient electrical power sources available to operate screening equipment.[21] Inappropriate construction of airport terminals may also preclude the use of large screening apparatus.[22] The precise scope of the less developed nations' security problems is impossible to determine, partly because the governments concerned are reluctant to admit that their airports and airlines are inadequately resourced and partly because no authority with the required information has publicised the extent of the need, for fear of disclosing delicate information which might be of use to terrorists. The current writer, however, has interviewed security experts who have acknowledged the existence of major security inabilities being experienced by many third world countries' airport systems. In Soviet bloc and eastern European states also there appears to be a considerable need for reassessment of security capacities at airports.[23] Polish academic Brunon Holyst has reported:

> " ... security units have magnetic gates at their disposal and hand detectors for checking out the passengers. In most cases, this equipment is outdated or not in full working order due to its long period of use and a lack of proper conservation services. They are part of the aircraft commodities and as such, should be successfully replenished by Polish Airlines "LOT"."[24]

Such deficiencies are presently being countered in the USSR where, according to the Soviet Deputy Minister of Civil Aviation, Mikhail Timofeyev, "a new generation of preclearance equipment" at "the level of the latest world achievements" is being developed and installed, to counter the growing threat posed by hijackers and other air criminals.[25] In 1989, 300 firearms, over two thirds of a tonne of explosives and 200,000 rounds of ammunition were found by using pre-

[21] Ian Gellard, quoted in *New Scientist* 7 January 1989, p. 23.

[22] B. Holyst, "The Abduction of Polish Airlines LOT Planes," *Violence Aggression and Terrorism* 3 (1989), p. 132.

[23] *Soviet Weekly*, 28 June 1990 (photocopy).

[24] Holyst (1989), p. 132.

[25] *Izvestia*, 25 July 1990, reprinted in Novosti Press Agency press release, July 1990, p. 3. On the spate of Soviet hijackings in the summer of 1990 see *Soviet Weekly*, 28 June 1990 (photocopy); *The Scotsman*, 2 and 6 July 1990 (photocopies); and *The Independent*, 6 July 1990 (photocopy).

boarding screening techniques on Aeroflot departures, suggesting both that a genuine threat of air crime exists in the USSR and that a great deal remains to be done to prevent and deter it. It was reported in 1990 that the risks of hijacking and sabotage were being taken seriously by Soviet authorities, which had decided to combine the competences of the KGB and the Interior and Civil Aviation ministries in a new security programme.[26]

The principal reason for inadequate security being found in the second and third worlds appears to be the expense involved for governments already overburdened with external debt and/or internal poverty, with liquidity difficulties and the poor supply of hard currency preventing investment in foreign technology and services.[27] One confidential report which was received by the current writer in 1990 described how a diplomatically prominent African state's foreign exchange crisis had affected resources for security operations. The country's only inter-continental airport was equipped with broken screening apparatus and staff untrained in alternative measures. In addition, absolutely no landside/airside boundary existed, with unrestricted access to aircraft being possible. At the state's domestic sites, no security equipment whatsoever was available, with perimeter fencing at best being "inadequate". As a result of similar gross inadequacies across the continent, the state's airport authority chief had described sub-Saharan developing African nations' standard of security as being "non-existent".[28]

This assertion is reinforced by experience, including that of the Air Afrique hijacking. More recently, on 20 September 1989, Brazzaville airport, in the Congo, was the last departure point for the UTA DC-10 which was sabotaged, crashing over a desert in Niger and killing 171 passengers and crew. The following day, the French airline's Vice President, Pierre Chagniot, stated that there were enormous problems involved in securing some African airports:

> "The security is very difficult in Africa with no fences around most of the airports. so it's very, very difficult to prevent people coming [into] the airport."[29]

Grave concern has also been voiced by IATA's Rodney Wallis, who has described the considerable social crisis which security needs recently caused at one African airport, a path over which inhabitants of two neighbouring villages used as their only connecting route. Also, the grass surrounding the airport runway was used by the villagers' cattle for grazing. A compromise between the requirements of security and access was struck only when the proposed layout for a new perimeter fence was altered to accommodate the access and grazing needs of the

[26] *Soviet Weekly*, 23 August 1990 (photocopy).

[27] Holyst (1989), p. 131.

[28] Confidential report on airport security (unpublished), received from Professor Paul Wilkinson, 17 January 1990. Broadly similar difficulties are outlined in President's Commission (1990), p. 35.

[29] *BBC, One O'Clock News*, Thursday 21 September 1989.

airport's peripheral communities.[30]

Security weaknesses in remote airfields may easily pose major problems for debt-ridden third world governments but they may also seem far distant and irrelevant to passengers and even security authorities in the more prosperous and better equipped states of the developed world. In fact, each hijacking and act of sabotage which commences at a poor state's international airport can, and normally does, have repercussions for many other countries, in terms of passenger casualties, hostage negotiations or subsequent criminal investigations.

It is disturbing to note that even in the least well-equipped airports of the world, airlines of foreign states (including those of the major aviation powers) are still prepared to operate, apparently oblivious to the considerable dangers being faced by their crews and passengers. Some carriers claim that they insist on minimum security standards to be introduced before flights can be scheduled to or from vulnerable sites. Others use their own, or sub-contracted, security teams at times of perceived need. Probably many more, however, choose to ignore perimeter inadequacies, other access weak points, staff shortcomings and basic screening difficulties, despite the growing threat to many nations of hijacking and sabotage incidents and of drug and terrorist infiltration from these poorly prepared locations.

As the security needs of airports are necessarily as diverse as the security conditions in which the sites operate, the list of required standards for less developed states' airports cannot be limited. Instead, considering that security is frequently non-existent and that resources are often difficult to allocate for the purpose of upgrading standards, it may be more useful to draw attention to a small selection of security needs which require to be resolved urgently, not so as to make less developed airports safe from all possible risks, but simply in order to bring them to a slightly more satisfactory state in the short term. This process might be accomplished first by assessing the precise needs of an airport, looking particularly at its size and international importance. After costing estimates and project planning have revealed the extent to which security reform is feasible and necessary, action could be taken to facilitate the three great areas of action covered by passenger screening, object screening and access control. If appropriate funds were to be made available, a useful minimum equipment listing for the protection of airports from basic threats might include the following, derived from a Canadian LDC airport security assistance scheme's suggested provision:

- walk-through metal detector devices;
- hand-held metal scanners (for passengers);
- explosive vapour detectors;
- carry-on baggage X-ray scanners;
- checked baggage X-ray scanners;
- access control and electronic surveillance equipment such as employee ID pass systems, video cameras, televisions and radios;
- fencing;

[30]Wallis, *Beaumont Memorial Lecture*, 1989.

- other ancillary equipment.[31]

With such equipment, operated by well-trained personnel and dedicated managers, a reasonable minimum standard of security might be maintained. Questions of resource availability, manpower quality and integrity from the risks of bribery and corruption would each require to be addressed for any fledgling security scheme to be operated with adequate efficiency. Discussion of the criteria by which such improvements might be made and of the means by which they could be monitored will be dealt with in the analysis of regional airports, below.

There can be no doubt that the upgrading of security where it is most needed will be an expensive and very difficult process, but it is equally beyond question that action must be taken for such upgrading to be instigated in the short term, otherwise the safety of the world's airline users and staff would remain in serious jeopardy. If the need to protect passengers and crew of all nationalities were not sufficient justification for upgrading poor security wherever it is to be found, the argument of interdependence would certainly provide it. It is clear that the entire civil aviation network requires more states than the rich and able to protect their airports and carrier services from terrorism. Hence, for example, if Geneva is more efficiently to be protected from the threat of hosting a political hijacking, or if French airlines are to preserve the safety of their passengers, crew and aircraft from bomb attack, then Brazzaville and Bangui must first be made safer. This inevitably implies that the poor and less capable members of the international community must be provided with channels of assistance to elevate their security standards to a more acceptable level of preparedness. This problem will be discussed below in the context of resource redistribution needs.

8.6. Regional Airports

Just as LDC airports' reform possibilities may be limited by practical considerations of finance, so may smaller airfields of the economically developed nations offering very limited schedules to a small range of similar destinations be restricted in their ability to introduce the most advanced and expensive of equipment and techniques. While the familiar argument of total security requiring total vigilance can be made to apply to any aviation setting, concessions may require to be made for airports operating restricted schedules and low risk routes. Otherwise it would be logically necessary to require Benbecula and Lerwick airports to operate, for example, explosives detection, advanced baggage reconciliation or computerised access control measures equal in quality to those which might be expected of Heathrow and Gatwick - a proposition which, though not impossible, it is hoped would never require serious consideration.

The aforementioned high technological systems which are currently being developed will display their strengths not as universally valid

[31] Information received by Professor Paul Wilkinson from Canadian aviation security consultant with government work experience, February 1990.

forms of defence for all sites, but rather as special measures for those airports the flights of which require an unusually high degree of protection. For most small airports (such as domestic airfields, club venues and community airports) security will require to be maintained at appropriate levels, though not necessarily with the equipment expected at larger sites.

Some more significant regional operations can be highly successful, representing a substantial proportion of national throughput. In the United Kingdom, for example, airports controlled by local authorities handled 21.5 million passengers in 1988 and hosted 23 per cent of flight traffic. Nevertheless, not all independent operations can be as financially self-sufficient as, for example, Manchester airport, which benefits from almost half of all British local authority airport traffic.[32] Economic problems surrounding independent regional airports can be severe, limiting their financial abilities to invest in expensive infrastructure. In particular, minor airports serving a small community will often be susceptible to unpredictable ticket price fluctuations and seasonal passenger trends.

In such conditions, maximum cost-effectiveness from all equipment can become an issue of basic economic survival rather than of profit growth, raising concern that a means should be found of defining security adequacy for such sites. Such a definition cannot embrace the constant and complete absence of passenger and baggage security activity for flights which can still be found at many small airports throughout the world, despite the demonstrated need for security to be taken seriously by all participants in the aviation industry. Rather, standardisation must seek to provide a truly adequate minimum standard of global security, below which no state, operator or airport should be permitted to fall.

Certain operational elements are involved in determining the extent of security preparedness required at smaller airports. These concern the criteria to be identified for adequately differentiating between airports of different security priorities, the qualitative variations in minimum security capabilities which should be tolerated and the concomitant limitations upon flight activities which should be imposed at sites deemed to be of a lower risk. In resolving the problems of regional airports' security gradation, it would be inevitable for some form of international standardisation to be undertaken, if only in the form of regional systems initiated by such organisations as ECAC. Once more, however, it should be noted that only global standardisation or a finely intermeshing regime of regional or trans-industry accords could suffice for a universally integrated solution of the difficulties to be achieved.

Dealing with the criteria which can be adopted for determining whether the most stringent, advanced and expensive of new techniques (as those described above) should be applied by aviation authorities, it is necessary to examine the factors which should contribute to an airport being designated a high risk site. As aviation terrorism is a predominantly international phenomenon (with international flights

[32] Publicity material for Joint Airports Committee of Local Authorities, 1990.

classically being targeted) and as flights characteristically feed into a vulnerable global aviation network, a strong case can be made for protecting airports which process international flights. Unfortunately, this criterion fails to recognise that many international airports operate with only a small number of international flights, a much higher proportion of activities centring on lower risk flights, such as by general aviation, operating private, non-scheduled traffic. Moreover, because the designation of an airport as international or domestic need have little bearing on its importance to terrorists (a factor ignored by the ICAO air crime Conventions) another, more acceptable, method of classification must be sought. Some flights of this nature should certainly be protected by modern means of security because the risk of hijacking or sabotage cannot be ruled out beyond reasonable doubt.

It is evident that an airport which accommodates only small aircraft might be expected to pose a lower risk of terrorist infiltration than a larger site providing a greater range of departures in more capacious aircraft. This is the case because only the latter type of airport can provide the larger, nationally identifiable and newsworthy targets which are and have always been the principal prey of the politically motivated offender. Recalling that in 1989 the FAA introduced its special priority rule concerning computerised access control to airports served by aircraft licensed to carry no fewer than 60 passengers,[33] it would be appropriate to suggest as a practical compromise between maximum security and financial viability that similar demarcations could be applied to airport security according to user carriers' aircraft types, with exceptions to that rule being permissible in the event of atypical, high risk flights on smaller aircraft being identified by authorities responsible.

With further study and more advanced international cooperation, a scheme might be found by which a broader variety of security levels could be formulated according to certain operational characteristics, such as aircraft size, passenger throughput or locations served. Already, internationally recognised standards exist for classifying airports in terms of passenger throughput, with the highest rating of "category 1" being applied to any site with more than two million passengers processed annually.[34] In 1989, the FAA categorised, or "phased" airports as follows for the purposes of introducing different levels of access control facilities:

TABLE 8.1.

FAA CATEGORISATION OF AIRPORTS BY PASSENGER THROUGHPUT

CATEGORY	ANNUAL PASSENGER THROUGHPUT
Phase 1	Over 25 million
Phase 2	2 - 25 million
Phase 3	0.5 - 2 million

[33]Nelms (1989), p. 690.

[34]W.A. Crenshaw (1987), p. 99.

Phase 4 Under 0.5 million.[35]

It should not be difficult to establish some forms of workable criteria by which regional operations could be classified.[36] By so doing, the least significant of sites might be permitted to operate with lower security preparedness, while moderately active airports would be required to impose a much higher level of security and major hubs would be expected to operate the most advanced systems. A central feature of such a scheme would need to be its reliance upon passengers and their baggage undergoing more stringent screening whenever they were to pass through any airport of a higher security category than those which they had previously encountered in their journey. While this might correctly be criticised as being inconvenient, expensive, time-consuming and possibly bureaucratic, graded security screening would act as an invaluable risk minimising mechanism in an otherwise ill-protected global system. Although screening cannot be universally high at all the world's airports. there can be no excuse for passengers boarding a flight at an unprotected site then transferring to another aircraft at a more sensitive airport without undergoing some form of screening appropriate to that transfer point's higher level of risk.

If low risk airports were to be provided only with the most basic level of defences, such as a constant police presence, complete perimeter fencing, simple security equipment and a small security personnel presence, minimal security levels could be maintained. These could be reinforced by a policy of total baggage reconciliation by passengers on the ramp and by staff being encouraged to report suspicious behaviour when observed. Of course, as has been stated immediately above, any flight from such a site, feeding into a notably more important airport would either require upgraded security activities to be carried out prior to departure or else on arrival would need its on-going passengers and their baggage to be channelled immediately to the landside of the transfer airport for stringent security screening to take place. If a carrier at a low risk airport wished to diversify its flights and offer departures in larger aircraft to more important destinations, it would require to upgrade the minimum level of security expected for all of its flights. In this way an on-going means of continual security assessment could be achieved, depending upon the willingness of state or private agencies to monitor the expansion of services and the accompanying need for increased security.[37]

Clearly, the security standardisation needs of the developing world's

[35]Nelms (1989), pp. 690 - 691.

[36]Already, FAA standards exist by which US airports can be rated for security purposes according to size, passenger throughput, location, vulnerability, security capacity, etc. N. Livingstone and D. Halevy in Lewis and Kaplan (1990), p. 227.

[37]Note that IATA has proposed that the industry should adopt a tiered approach to security, with activities being carried out in accordance with three categorisations of risk. IATA, *Airline Security and Fraud Prevention* (Montreal: IATA, 1987) p. 2.

airports and of the developed nations' regional sites are not dissimilar. In each case, a means must be found of establishing the international standards described above and, of equal importance, of providing resources to precipitate required reform.

8.7. Financial And Implementational Reform Problems

The possible improvements detailed above represent the tip of the security iceberg, for much more can and must now be achieved to make security adequate for the challenges which it will face in the future. While it is, therefore, vital that security should be a key priority for policy makers, it is regrettable that the issue has rarely been high on the political agenda of developed nations' governments, most of which rely on the private sector to operate security activities within broad and often ill-conceived regulatory parameters. Security reform now requires that these delineations of competence be defined more rigidly, with greater state involvement taking place and increasing standardisation made of practices and procedures internationally.

It should not be assumed, however, that any moves towards governmental activity and a global overview of aviation security can be implemented with ease, as states may be constrained by an ignorance of the aviation community's needs or by an unwillingness to risk the consequences of reform. For example, fear of failure in the electoral democratic setting and a desire not to offend foreign governments which support terrorist organisations can contribute to this lack of political will, but one factor overrides both of these and is potentially more damaging than either. Governments are reluctant to undertake a radical reorganisation of global aviation security operations because of the vast expense which would inevitably be involved. No accurate figures can be found to illustrate the extent of investment necessary for the task but it is certain to run into billions of dollars worldwide.[38] Although such a figure may disquiet the minds of governmental and industry policy makers, it should be noted that the major tasks of security reform would require only a small proportion of total operating costs for a large carrier, when judged by the expenditure daily entailed in covering fuel, salaries, landing dues and other simple outlays. Nevertheless, even major powers which benefit greatly from the success of civil aviation, such as the United States, seem more concerned with propping up budget deficits by means of unused aviation trust funds than with investing available resources in the future of the industry.[39]

To give some indication of current public spending levels on security technology research, the British Department of Transport's research budget for aviation security equipment in 1988 was only £500,000. As a result of the impetus of Lockerbie this was doubled to a figure which must still be unable to make a significant impact upon the

[38] Estimate of Professor Paul Wilkinson, 1989.

[39] *Channel 4, Dispatches,* Wednesday 20 December 1989.

security crisis.[40] By contrast and despite the above-noted budgetary constraints, comparable US Federal Aviation Administration budgets for 1988 were set at ten million dollars (US).[41] What is required is a means of financing security quickly and effectively, because it is evident that while terrorists continue to hold the upper hand they will use their powers and freedoms to greatest effect. There is a clear case to be made for urgent public sector financing and control of all operational aspects of aviation security, based on the indisputable fact, mentioned above, that terrorists attack a nationally-identifiable aviation target because it is likely to be perceived by the media and the public as a political extension of a particular government. In the words of Geoffrey Lipman, the Executive Director of IFAPA:

> "The objective is not to disrupt aviation - that's only a means - the objective is to destabilize governments. In the final analysis, the response is a government responsibility - and it should be met out of general funds for police, security, or even national defence."[42]

In 1989 this costing analysis was echoed by the UK House of Commons Select Committee on Transport:

> "Whoever was responsible for the destruction of Pan Am flight 103 had the Government of the USA as its target rather than a particular airline and its passengers. For this reason alone, the Government should provide an increased input into security funding. If greater justification is required, Lockerbie has shown that passengers are not necessarily the only victims of lapses in aviation security. If the trend towards sabotage rather than hijacking continues, we are all at risk."[43]

Countries of the rich developed world could afford direct financial involvement in security - indeed, some actively finance aviation security operations as part of their state defence programmes. A distinction which requires to be drawn at this point is that between the operational spending of individual governments, airlines and airports which enables current techniques to be employed day by day, evolving slowly and independently within each state, and the strategic spending which is now required to raise global capacities to a tolerable level for response to new types of terrorist threat. While both public and private sectors have been forced by recent events to concede that a new, more dedicated approach may now be required, no systematic, properly resourced proposals for such strategic financing have been put forward by either. This unfortunate omission from long-term planning is, however, understandable as no agency has been able

[40] *New Scientist*, 7 January 1989, p. 23; Press release from the Department of Transport, September 1990.

[41] O'Ballance (1989) I, p. 19.

[42] G. Lipman in Mendes de Leon and Zwaan (eds.) (1987), p. 108.

[43] House of Commons Committee on Transport (1989).

to make accurate costing estimates for any radical reform plans.[44] In the most general of terms and guided by precedent on this subject, it might be predicted that states would be unwilling to pay the considerable price for any large scale reform packages, while the industry would be largely unable (in anything but the long term) to find the moneys required from within its present financial structures. Apart from the question of resources, organisational problems are entailed by reform needs, because it is difficult to identify which agencies would presently be prepared to oversee the global renewal of security capabilities.

8.7.1. ICAO Assistance Activities

In recent years, ICAO has expanded its operations concerning aviation security. Of particular interest is the creation (following the Air India sabotage of 1985) of a permanent Aviation Security Panel to oversee the setting of security standards and recommended practices. In addition to this undoubted administrative advance, the Organization has been active in developing certain financial mechanisms to assist states in upgrading security capabilities. ICAO's resource redistribution activities have traditionally been carried out through its Technical Assistance programme, operated by the Secretariat's Technical Assistance Bureau with the assistance and supervision of the United Nations' Development Programme (UNDP).[45] This UN programme has been relied upon by ICAO to facilitate the aviation development of many poorer states, though the finances available to the Organization have traditionally been very low. In 1986, for example, net expenditure for ICAO's UNDP and other extra-budgetary projects was estimated at only $10,545,000 (US) with security upgrading schemes representing one of many benefiting causes.[46] To compound difficulties, the UNDP finance available in any given year is dependent upon prevailing economic and political conditions. Hence, from 1982 to 1983, total UNDP funding declined from $76,400,000 (US) to approximately $70,000,000 (US).[47] The Technical Assistance Bureau was allocated only approximately $60,800,000 (US) for 1989.[48] ICAO has described the limited operation of the UNDP for aviation projects in the following terms:

> "Under the UNDP, the execution of the planned programmes and projects is delegated to the International Organizations as Executing Agencies; in the case of aviation projects, ICAO serves as the UNDP's Executing Agency. The degree of ICAO's participation is determined by the individual requests submitted by the Governments of developing countries, which are responsible for deciding what portion of the total assistance made available

[44] Vincent (1989), p. 40.

[45] "Five Large Assistance Projects Announced," *ICAO Bulletin*, 44 (May 1989), p. 31.

[46] ICAO, *Memorandum on ICAO* (ICAO: Montreal, 1984), p. 54.

[47] *Ibid.*, p. 46.

[48] *Europa World Year Book 1990*, (London: Europa, 1990) vol. 1, p. 68.

to them by the UNDP should be used for civil aviation; on the average, during the past three decades, some four to five percent of the total resources made available by the UNDP has been used for this purpose, although certain countries have devoted a much larger proportion to aviation projects."[49]

An indication of the severe limitations imposed upon the UNDP is to be found in its allocation of merely $1.2 million (US) to assist in the improvement of Asian airports' security systems.[50] In addition to this inadequate and sporadic funding received from outside ICAO, the Organization can now itself provide a facility to developing states whereby an agreement is made involving the depositing of funds for the purpose of resourcing future assistance. These "Funds-in-Trust" programmes allow ICAO to act in the knowledge that resources are available to finance their services.[51]

The Organization reconsidered its security-oriented aid granting role after the growing threat of sabotage had been made clear to its member states in the Lockerbie atrocity of December 1989. The 126th Session of the ICAO Council met in February 1989, when many transportation ministers were present to consult at the highest governmental level on key questions of security. The meetings resulted in the adoption of an interesting combination of decisions, some of which were traditionally bland, with others being slightly more adventurous than would normally be expected. Conscious of the need for some form of international activity to be undertaken following the Pan Am tragedy, the delegates unanimously adopted a resolution in the hope of precipitating future concrete work in the field of security. Of its thirteen resolving clauses, six dealt with practical action for states. They are presented below to indicate that although the meeting was attended by ministers with considerable powers, those proposals adopted for the guidance of domestic executives represented classically hortatory, non-commital and half-hearted ideas, instead of strongly worded, explicit and practical initiatives which - if supported by resourcing provisions - might have prompted immediate progress:

"THE COUNCIL ...

4. URGES member States not yet party to the Montreal Convention (1971) to become parties to that Convention and its Protocol at an early date;

5. CALLS UPON member States to continue to assist in the investigation of such acts and in the apprehension and prosecution of those responsible;

6. CALLS UPON member States to intensify their efforts for the implementation of existing Standards, Recommended Practices,

[49] ICAO (1984), p. 46.

[50] *Jane's Airport Review*, February/March 1989, p. 40; President's Commission (1990), p. 35.

[51] ICAO (1984), p. 52.

and Procedures relating to aviation security, to monitor such implementation, and to take all necessary steps to prevent acts of unlawful interference against international civil aviation;

7. FURTHER CALLS on member States, while respecting their sovereignty, to substantially enhance co-operation and co-ordination between them in order to improve such implementation;

8. URGES member States that have the means to do so to consider increasing technical, financial and material assistance to States in need of such assistance to improve aviation security through bilateral and multilateral efforts, in particular through the ICAO Technical Assistance mechanism;

9. URGES member States to expedite, in the light of Assembly Resolution A26-7, App. C, research and development on detection of explosives and on security equipment, to continue to exchange such information, and to consider how to achieve an international regime for the marking of explosives for the purposes of detection."[52]

Hence, the important matters considered in the clauses were intimated as continuing to lie predominantly within the scope of states' individual fields of action, rather than being issues on which the ministerial meeting of the Council would provide a coordinated lead. Instead of facilitating the leadership which the aviation community needed to bring about reform, the ministers made clear their unanimous satisfaction with continued domestic control of security. It seemed that if internationally coordinated progress were to be made, the Council would rather urge it than facilitate it.

On a more positive note, although no major reform was promoted for the international level, the ministers were able to agree that ICAO itself should be better equipped to deal with responses to newly experienced terrorist threats and should be more able to respond to the needs of states with poor security infrastructures. The resolution directed the Committee on Unlawful Interference among others to investigate the need for new Standards and Recommended Practices on security to be drafted for inclusion in Annex 17. Also, the Committee was requested to determine (with the assistance of the Aviation Security Panel) the action which should be taken on some key areas of concern, including explosives detection, hold baggage screening, security of electrical equipment, reliable baggage reconciliation, cargo, mail and courier services, access control, advice to states, an ICAO monitored security training programme and security surveys.

The President of the Council and the Organization's Secretary General were each requested to submit any relevant issues for consideration to ICAO bodies with responsibility for fields not directly related to security and to propose to the Council means by which the ICAO

[52] *Resolution adopted by the Council of the International Civil Aviation Organization at the 7th Meeting of its 126th Session on 16 February 1989*, resolving clauses 4 - 9.

Secretariat's security team might be strengthened. During one of the Council meetings, the President and General Secretary proposed that the post of head of the security unit should be upgraded to the level of Principal Officer to reflect the growing importance of the subject, and that the staff be doubled in size to six, or possibly seven, depending on funds made available by states. The expansion of the unit was intended to permit the provision of advice and assistance to states, as by surveying airports' security activities, writing security programmes and assisting with staff training. The proposal was adopted unanimously, with the aviation security branch of the Organization eventually growing in size from three staff to eight.[53]

One other modest advance made by the ministers, concerned the establishment of a mechanism for technical, financial and material assistance to be provided through ICAO to states with regard to aviation security.[54] The resource redistribution mechanism is designed to supplement the very limited work currently undertaken by the Organization's inadequately funded Technical Assistance programme, mentioned above.[55] The many problems associated with this system resulted in 1989 in the ICAO Council and the Committee on Unlawful Interference each concluding that a better way of financing security upgrading required to be found:

> "While the important role played by the UNDP through the ICAO technical Assistance programme was recognised as the mainstream of assistance, the inadequate availability of funds, the elaborate administrative constraints governing its operation and the time frame involved, dictated the need to complement it with a subsidiary funding mechanism at a modest level to start with, which would allow greater flexibility, immediacy and a more pragmatic approach to specific problems requiring urgent and limited attention in time and scope."[56]

In framing the objective of its new, complementary aviation security assistance programme, ICAO was careful not to restrict its freedom of action to go beyond the bounds of its general and rather imprecise security Annex:

> "The purpose of the aviation security assistance programme will be to provide the required assistance to States to meet

[53] ICAO information received after ministerial meeting of Council, February 1989; *Airports International*, January 1990, p. 19. For information on the new roles of the expanded aviation security branch, see *Flight International*, 10 - 16 January 1990, p. 5.

[54] *ICAO Working Paper A27-WP/64 EX/19 12/7/89.*

[55] Note that funding shortages have left ICAO unable to provide adequate assistance to a great many of its member states:

> "ICAO has targeted its limited resources toward potential threats in Africa, virtually ignoring the rest of the world." President's Commission (1990), p. 35.

[56] ICAO Working Paper *A27-WP/64 EX/19 12/7/89*, paragraph 2.1.

> their obligations through the fulfilment of the objectives of Annex 17, as well as other objectives related to the improvement of aviation security."[57]

The new initiative should allow many poorer states to benefit from ICAO security experts' airport inspections and advice imparted on site or through local or regional seminars, with resources for training, minor costs for some security equipment, assistance in kind and certain other forms of aid also being provided. It will represent a new and unprecedented level of direct commitment from the Organization which, for the first time in relation to security, will be in a position of operational independence from individual states, from which position truly direct assistance will be offered on a priority basis. ICAO's particular willingness to become involved in surveying states' airport capacities is heartening, as it should provide that a global intergovernmental agency will join state authorities (such as the FAA) and private initiatives (such as IATA's limited but successful Intensified Aviation Security Programme) in this vital role.[58] ICAO's surveys may even become more popular with governments than either the FAA or IATA alternatives, because they will not be associated with a foreign power or the airline industry and will probably be more readily available. Even in the private sector surveys, there can be a degree of tactful imposition upon states, as IATA's Wallis has observed:

> "If we can't get an invitation from a government at an airport where we know there is a problem then we try diplomatic persuasion. We've never failed to go where we've been needed."[59]

The fact that ICAO's new form of surveys is offered purely for the benefit of requesting states, and not with any intention of coercing modifications to be introduced, should assist in their promotion and so aid their development. The plan for the scheme's administration is simple, being based on the following proposal:

> "The aviation security asistance programme will be under the control and supervision of the Council and administered by the Secretary General:
>
> a) it will be administered as part of the regular programme and will operate separately from the technical assistance programme;

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[57] *Ibid.*, paragraph 4.1.

[58] IATA's inspection of airports by its security task force (drawn from staff of participating airlines) commenced in 1976 and has operated since that time purely in response to governments' invitations. As a measure of the extent of its operations, it is significant that in the eleven years to 1987 only 40 airport surveys were undertaken in 30 states, although the programme was very substantially expanded in the late 1980s. IATA (1987), p. 3; Norton, (1987) p. 32; and Wallis in Mendes de Leone and Zwaan (eds.) (1987), p. 92.

[59] *Jane's Airport Review*, February/March 1989, p. 40.

b) accounting will be provided by the Finance Branch using strict procedures with reports provided to donor States as required;

c) standard audit procedures will apply and periodic reports will be made to Council;

d) output from this programme will be in addition to the existing programme of voluntary bilateral assistance between States; and

e) provision will be made so that States can contribute to the corpus of the assistance programme by other than financial means such as:

1) short-term assignment of experts for special projects;

2) fellowships;

3) equipment;

4) training programmes and training aids."[60]

The success of the scheme will be completely dependent on the prolonged willingness of richer states to subsidise the poorer because, while a well-resourced scheme could lend meaning to the resolving clauses on domestic action quoted above, it is equally true that any pointless financial gesture could be expected to relegate them to the level of mere recommendations. Initial undertakings made by certain ICAO members gave the Organization confidence that adequate funds might be made available for the scheme from such sources as discretionary payments and the realised surplus from some states' annual budgetary commitments to ICAO.[61] It is regrettable that confidence should have been allowed to be built on so uncertain a foundation, as any such ad hoc funding can provide absolutely no guarantee of continued progress beyond the end of each fiscal year.

What is needed is not the unspecified remainder of certain members' yearly contributions, but a definite commitment of considerable funds over a long period. While this new ICAO venture may help to overcome security difficulties on a small scale, the discretionary, inadequate, unpredictable and essentially arbitrary nature of its state funding must mean that it will not be able to deal with the fundamental problems facing the aviation community as a whole. Hence, although the arrival of an ICAO-sponsored scheme can be viewed as a significant global initiative to assist states in improving their operational capacities, the pressing need for an integrated structural approach remains virtually untouched by recent developments.

At some time in the future it is at least theoretically possible that

[60] ICAO Working Paper *A27-WP/64 EX/19 12/7/89*, paragraph 5.1.

[61] *Ibid.*, paragraph 3.2.

governments could find an efficient and financially adequate means of transferring their resouces to nations in particular need of security reform. Based on recent experiences of much less grandiose resource plans, it is almost certain that in order to do so, many years of wasteful bargaining would be required merely to establish which states should pay how much money to which agencies. Additionally, it may prove easier for large nations to avoid universal means of resource redistribution, relying instead on politically more attractive, though effectively less far-reaching bilateral or regional accords with friendly third world states - ignoring the needs of the ideologically incompatible.[62] Since the middle of the 1980s, the United States has financed general security upgrading on a bilateral basis, offering certain foreign governments aid under its International Security and Development Cooperation Act, 1985.[63] Section 502 (a) of this Act authorises the Secretary of State to coordinate anti-terrorism assistance by the US Administration to foreign countries' authorities.[64]

Beyond these considerations, practical difficulties of implementing intergovernmental projects in a politically neutral manner would require to be resolved as, for example, support for security reform in one region might give rise to accusations of geographical or political bias from another. Even with ICAO having decided to support states' bilateral aid packages by providing for overlooked nations from its own security budget, resources will not permit a comprehensive coverage of the world's security needs. An apolitical alternative to direct state funding might provide the required impetus to promote security reform as a short term venture. One such scheme will be described immediately below.

8.8. A Passenger-Funded Security Strategy

The global security crisis which was thrust into public attention immediately after the Lockerbie disaster of December 1988 prompted concern within certain sections of the aviation industry. Of particular interest was the attitude taken to the difficulties facing the world's airports by IFAPA in Geneva, which correctly recognised that as a result of governmental funding being difficult to locate timeously in sufficient amounts and from reliable sources, another means of strategic spending required to be found in the short term, if only to instigate some moderate advances in aviation security which might be consolidated upon with more determined action later. In early January 1989, IFAPA's Executive Director, Geoffrey Lipman contacted the Foundation's security advisory team of Paul Wilkinson and the current writer with the framework for a simple but promising funding scheme.

Lipman believed that IFAPA's research work over the previous three years had identified unsatisfied demand from airline passengers for

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[62] *Airports International,* January 1990, p. 19.

[63] Public Law 99 - 83 - August 8, 1985.

[64] For details of the State Department's Anti-terrorism Assistance Programme, see President's Commission (1990), p. 35.

improved security and that this demand should be met by an international initiative designed to promote advances in global security capacities. He suggested that a scheme financed entirely by passengers could provide a sizeable fund to be administered internationally.[65] The rationale for this proposal was one of necessity rather than of responsibility, as IFAPA recognised that under normal circumstances fare-paying passengers should not be burdened with additional expenses.[66] However, realism dictated that emergency conditions could only require emergency tactics, thus entailing resort to the most direct and apolitical sources of available funding, for a swift and effective response to be commenced.

Radical improvements in global security capacity could, Lipman suggested, be financed through the global imposition on airline travel prices of a modest one dollar (US) security levy for each air journey made by airline users, the levy being clearly marked on passengers' tickets.[67] With over one thousand million such journeys being undertaken in 1988 alone and with the market for flights growing at a considerable rate,[68] universal adherence to the scheme by the industry (which might administer it) and by states (which might regulate and monitor it) would accrue a considerable fund in a very short time.

A problem which beset IFAPA's proposal concerned the stated reluctance of certain governments and agencies to employ levies for security matters. Although authorities are normally keen to pass costs to fare-paying passengers,[69] the British Department of Transport has maintained that a UK security levy for domestic application which operated between 1978 and 1983 was "bureaucratic, complicated and costly to administer, and provided little incentive to efficiency."[70] These arguments may have influenced Secretary of State Channon in his decision to reject IFAPA's international levy proposal when, in 1989

[65] *The Glasgow Herald*, 10 January 1989, p. 9.

[66] Ample evidence exists to show that operational security costs are often concealed in passengers' ticket prices. Almost from the outset of the US security initiative of the early 1970s, security costs were accommodated in a $0.34 charge on users. McWhinney (1987), p. 84.

[67] D. Johnston, *Lockerbie* (London: Bloomsbury, 1989), p. 194.

[68] *Plane Facts*, January 1989, p. 4.

[69] Note, in particular, that passenger surcharges were introduced by the US Administration specifically to finance new aviation security activities as early 1 April 1973. Moore (1976), pp. 17 - 18.

[70] British Government (1986), p. 14.

it was submitted to him for consideration.[71] It is, nevertheless, interesting to note that after the Pan Am Flight 103 incident, a £0.30 security surcharge was imposed at certain British airports.[72] Factors of bureaucracy, administration and efficiency were certainly the principal policy determinants of the International Organization of Consumer Unions (IOCU), a body which rejected IFAPA's levy proposal as being ill-founded and unnecessary.[73]

These reasons cannot be viewed as being conclusive in condemning the notion of the passenger levy, because the mechanism has, in the recent past, been adopted successfully and often unfairly to cover such areas as customs costs, domestic airport security, immigration, airport expenses, airline default insurance, and even state fiscal greed in the form of non-itemised departure taxes.[74] In 1986, the United States imposed a five dollar (US) international departure tax to act as a security supplement to an existing three dollar levy.[75] US carriers have been allowed to surcharge travellers for costs incurred by introducing new EDS equipment.[76] On 1 January 1987, France introduced a security surcharge of 8 - 10FFr. per departing passenger.[77] On 1 July 1990, the Federal Republic of Germany permitted its airports to impose a 3.50DM security levy on all passengers.[78] Also, the US Airport and Airway Trust Fund has been accrued from passenger levies and has served very effectively to provide US airports with "entitlement" funds for projects in many areas. An impressive $818 million (US) was liberated from the Fund in

[71] Note the contents of a letter, dated 15 February 1989, from the Secretary of State's Private Secretary, Roy Griffiths, to Geoffrey Lipman:

> "While the Secretary of State agrees that we must improve security worldwide, he has reservations about an international fund. His view is that the resources available through normal ticket sales are sufficient to finance security, and that there is no reason for either Governments or the industry to plead shortage of funds."

[72] *The Glasgow Herald*, Saturday 30 June 1990, p. 7.

[73] Discussion with John Loder, IOCU delegate to ECAC, Paris, France, September 1989.

[74] *The New York Times* editorial, reprinted in *The International Herald Tribune*, 21 July 1986 (photocopy); Lipman, *The International Herald Tribune*, 31 July 1986 (letters column) (photocopy); Lipman, *Travel Weekly*, 11 September 1986, pp. 12 - 14.

[75] *Plane Facts*, September/October 1986, p. 1.

[76] McGuire (1989), p. 6.

[77] *Plane Facts*, December 1986 / January 1987, p. 3.

[78] *The Glasgow Herald*, Saturday 30 June 1990, p. 7.

the 1989 fiscal year.[79] Other, arguably less easily justified, forms of passenger levy have been suggested to cover other areas of aviation activity and might be implemented in future.[80]

Moreover, any finance-raising means requires to be administered, so certain arguments of bureaucracy would apply irrespective of the merits of the method used. In an industry in which state levies have been used effectively for a wide variety of purposes (not all of which have been entirely legitimate) there should be no scope for principled opposition to the IFAPA scheme from agencies which have benefited from more exacting taxes in the past. A security levy of the type envisaged could easily be designed to be minimal in its effect on ticket prices, short-term in its imposition and perpetual in its benefits.

The foregoing discussion of the industry's conservative tendencies and states' insular concerns in the realm of security should serve to remind that universality in matters of air crime is seldom more than a distant goal. For this reason, IFAPA concluded that total industry and authority support for such a scheme should not be expected. Even when considering only international flights and recognising that many states could be expected to boycott the scheme, IFAPA estimated that support from major aviation powers could result in the introduction of a fund which might accumulate as much as two or three hundred million dollars in the scheme's first year of operation. Combined with the possibility of voluntary contributions being offered by concerned states and by the industry itself, a target of one billion dollars could be reached perhaps within four years, at which point contributions could cease. From that point the fund would be self-sufficient for future years by generating over a hundred million dollars per annum in bank interest, which would then be disseminated to approved projects and used for strengthening global security as a modest but sure long term strategy.

The proposed levy figure of one dollar (US) is significant because it would represent only a very small increment to ticket prices yet could result in a major fund being accumulated in time. This fund would be used with the intention not of solving the world's security resourcing difficulties in the short term, but rather of providing a motivating force by which long term progress might be encouraged.

Precisely computed costing estimates for required projects based on

[79] *Jane's Airport Review*, June/July 1989, p. 9. Koch has remarked that in 1989 the Aviation Trust Fund enjoyed a surplus of an astounding $5.8 billion (US) with annual revenue at the time standing at $3.6 billion (US). His suggestion that the Fund should be tapped by the FAA to provide resources for security enhancement should be considered seriously. *International Herald Tribune*. Tuesday 4 April 1989 (photocopy).

[80] In particular, the United States has suggested that the Warsaw Convention, 1929, might be revised to include an insurance component financed by a permanent $5 (US) passenger levy on all international flight tickets. H. Caplan in Lewis and Kaplan (1990), pp. 133 - 134.

the actual security needs of the global aviation industry would be difficult to determine with accuracy but could be expected to exceed the proposed figure. For this reason, it should be stressed that the levy's purpose would not be to raise standards to a required level of excellence by any precisely cost-assessed mechanism or by permanent use of passenger levying. Instead, it would be intended first to provide basic, emergency funding to satisfy the greatest security reform needs, then to function as a catalyst, encouraging necessary resources to be made available from states. If the levy were to be set at one dollar on the clear understanding that it would not be subject to increase and would be phased out after a limited and specified number of years, an equitable and responsible framework for establishing a security fund could be set in place.

In terms of accumulating the money, IFAPA has suggested that the collection of passengers' levy contributions need not cause undue administrative difficulties because an existing industry channel might be employed for the purpose, if its operator, IATA, could be persuaded of the need for action:

> "The easiest way would be through a ticket surcharge remitted through the airline Clearing House. This would eliminate any extra line-ups at airports and would cover most of the passengers on scheduled airlines. A precedent exists for the worldwide collection of international surcharges to cover dramatic fuel increases in the 70s. Charter and domestic airlines could remit, however, through nationally appointed agencies - based simply on the total number of passengers carried."[81]

There is little doubt that an adeptly administered fund could contribute to the establishment of a broad range of beneficial projects including research and development programmes for more efficient and cost effective screening systems, grants and/or soft loans for less developed countries (enabling vital investment in technology to be made) and training schemes to give a comprehensive security education to personnel in rich and poor countries alike. Another, much more ambitious, security-related objective of the fund might be internationally standardised research into computerised passport systems to aid in the identification of terrorists in transit.

Because of the need for international coordination of such a levy fund proposal, IFAPA and its security advisers agreed that the offices of ICAO would be uniquely, if not ideally, suited to administering the fund. The reasons for this decision were that ICAO is the foremost forum for high-level aviation regulation, with a skilled and experienced Secretariat, with a key interest in promoting security development on a global scale and with the ability to influence industry policies via governments which send delegations to its headquarters in Montreal. While non-governmental bodies such as IATA could easily administer a fund, it was agreed that the nature of the work to be undertaken with fund income would often require action to be taken by states, rather than by carriers or airports. Hence, a body which constituted part of the United Nations system of

[81] *Plane Facts*, January 1989, p. 3.

Specialized Agencies and which had displayed a useful, if flawed, record of promoting state activity was deemed to be a more appropriate custodian of a security fund.[82]

It was originally proposed that, if instituted, the fund should be administered centrally by ICAO in Montreal, with direct intergovernmental involvement and control being exercised in order to overcome administrative and diplomatic problems caused by the limitations of state sovereignty. Sadly, however, private conversations between the current writer and a security officer of the Organization in September 1989 revealed an unwillingness to consider a security levy as a realistic funding solution. The staff member claimed astutely that member states of ICAO would almost certainly elect to block any effort systematically to internationalise the financing and standardising of security administration, because governments are jealous guards of their sovereign discretion in sensitive areas of aviation policy which have always been subject to the protection of domestic jurisdiction. No scheme which placed the allocation of hundreds of millions of dollars in the control of a bureaucracy or of a fluid collection of states could expect to find support from the major members of the aviation cartel.[83]

Another factor which must be considered is that of the Organization's budgetary provision. In 1989 the total net budget appropriations were $33.7 million (US) to finance ICAO's entire internal operations.[84] The sudden arrival of an extra annual spending allocation amounting to virtually three times that figure might cause nervousness in the Organization's Secretariat that it was expected to administer a wholly unprecedented magnitude of resources in an efficient and equitable way for only one specific area of activity. The security officer made it clear in private discussion that he thought that ICAO would not be prepared to take on the extra workload and difficult administration of

[82] While the Chairman and President of one of the world's foremost airlines enthusiastically supported IFAPA's surcharge suggestion (in a letter addressed to Geoffrey Lipman, dated 8 March 1989), he warned that "ICAO is not action oriented!" so should merely be encouraged to continue in its role of prescribing international performance standards. He also noted his corporation's "grave reservations about assigning operational responsibility to ICAO." In response, Lipman commented (on 24 March 1989) that no individual government or private sector body could combine ICAO's authority and respectability. The levy proposal was, he claimed, "designed to push ICAO and governments to act on the responsibility to provide protection to passengers."

[83] There is, of course, no administrative reason why an intergovernmental organisation should be equipped to take care of large scale global aid funds. As examples, note that two other UN Specialized Agencies, the Food and Agricultural Organization (FAO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) each operate field programmes in which over $300 million (US) are disseminated annually. *Europa World Year Book 1990*, vol. 1, pp. 54 and 80.

[84] *Ibid.*, vol. 1, p. 68.

so politically sensitive a fund.[85]

These blunt admissions amounted to an honest and deeply significant recognition that states effectively wish to preside over a badly regulated, insufficiently resourced and uncoordinated set of aviation security practices in preference to acting for the benefit of air travellers, because that action would require a lowering of their barricade of sovereignty. As such it was an endictment of an intergovernmental body composed of member states divorced from the needs of the industry which they are supposed to serve and which are doggedly unwilling to adapt outdated attitudes to the evolving issues of air violence suppression. Predictably, perhaps, ICAO will be able to conceal its members' weaknesses behind its ad hoc resource scheme, which cannot provide adequate finance to bring about meaningful reform, but which can be expected to serve as a public relations tool and an excuse for further inaction by member states.

IFAPA remains convinced that ICAO would be able to operate a levy-financed security fund, were it to be given the opportunity and incentive to do so. However, recognising that this forum may be precluded by its membership from operating in so radical and fast-moving a way, other fora should be considered. Wilkinson is in no doubt that private sector alternatives exist:

> "In the light of the great reluctance of nation-states to pool even a small part of their sovereignty in the interests of combating terrorism, the world civil aviation community - passengers, aircrew, airlines and airport authorities - should give careful thought to the possibility of taking further measures of self-help, using the channels of their international non-governmental organisations such as IFALPA, IFAPA and IATA.
> ...
> They are in a unique position to take the initiative in starting an international aviation security fund. If governments prove unwilling to act there are other ways of collecting and administering the money. IATA and the airlines and consumer organisations should take joint steps to initiate a special passenger levy; to set up an independent body to administer the funds; and to establish and monitor a programme of security technology research and development, enhancement of security management and training, and a proper international airport security inspectorate. Governments and intergovernmental organisations are not the only bodies capable of performing these tasks. The aviation industry must act itself if goverments fail to act."[86]

Wilkinson is correct in noting that private organisations can achieve similar goals to those which ICAO might be encouraged to follow. However, he and IFAPA believe that intergovernmental involvement could

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[85]Private conversations with ICAO security specialist, September 1989.

[86]P. Wilkinson, "Aviation Security in the 1990s - The Lessons of Lockerbie," *International Security Review*, January/February 1990, p. 25.

result in vital advances being made which would not be possible in private fora. For example, activities such as airport inspection and monitoring are much more effective when carried out under the auspices of government-backed agencies. It is clear that well-organised inspection schemes operated by the Organization would be more highly valued and respected than IATA's ad hoc and small scale activities in the field. Even existing ICAO inspection facilities offer states the benefits of high-level consultation and support, without the need of state-backed threats. If this service could be extended and made more freely available through systematic funding initiatives, the Organization would be acting for the benefit of global security.

Also, in matters involving integrated policy decisions, intergovernmental agencies can agree upon coordinated action, while private bodies are forced to debate at a lower level, taking decisions only on industry-wide bases. Hence, every effort should be taken to convince states that ICAO remains the key to broad success in matters of security reform, because no other aviation body commands sufficient authority with governments. If ICAO's members are to be convinced of the need for integrated, large-scale financing of security enhancement as an immediate means of promoting advances, it is clear that their fears must be dispelled - by no means an easy task. As the Organization's poorer member states have long noted an interest in adopting effective resource distribution measures,[87] and as all member states could be expected to support the principle of technology development which requires no public funding, it follows that the notion of a privately funded security initiative might receive general support, provided that resources were to be used where they would be most badly needed and that adequate control of the funds involved could be ensured for major powers.

Incentives would be required to reassure the richer states that any decision-making process involving a security fund would be based on equitable foundations which would not alienate the developed aviation nations by giving unprecedented freedom of action to the numerical majority of developing countries. One means by which this might be achieved would be to place the fund in control of a new ICAO Commission on Aviation Security, which might incorporate the existing Committee on Unlawful Interference and Aviation Security Panel. The proposal for a Security Commission is not new, having been made by the Israeli delegate to the 26th ICAO Assembly in September 1986. At that time, it was suggested unsuccessfully that the Committee on Unlawful Interference should be upgraded to the status of a Commission so as to give security a higher priority in the affairs of the Organization.[88] Another reason for wishing to supercede the existing Committee's structure is that its membership of fifteen is elected by the Council, solely from representatives of Council member states. By contrast, the Air Navigation Commission's membership is appointed by the Council, but from nominations received from any Contracting State.

In the 1970s, when the rigid bloc structures of ICAO precluded more

[87] See the discussions of the ICAO Montreal Conference, February 1988, Montreal, Canada. See also Hill (1989), pp. 97 - 98.

[88] ICAO Document A26-WP/75 EX/15 22/9/86, paragraph 2.2.

meaningful cooperation by its members on the powers to be contained in the Hague formula, it would have seemed extremely unlikely that any such proposal for a security authority could meet with support. Recently, however, signs of hope have emerged, with the creation of the Aviation Security Panel, with ICAO taking a more active role in promoting security enhancement in developing nations and with a general lessening of east-west tensions. Above all, the broad support from many of ICAO's members for Arnold Kean's scheme for the creation of an Explosives Technical Commission as a vital element in the proposed ICAO agreement on marking plastic explosives (discussed above) could act as a prelude to more detailed standard-setting arrangements, with similar structures being adopted for other areas of security activities.[89]

The Commission could partly comprise a small selection of states representing the most important aviation powers. This selection could be made by, for example, appointing to the Commission the five states with the biggest global shares of scheduled airline travel, a three-yearly accounting assessment being made for this purpose. These major powers would be joined on the Commission by a majority of states to be chosen by the ICAO Council (on recommendations received from any ICAO member) serving for staggered three year terms of office. A Commission of fifteen members (equal in size to the Air Navigation Commission) would be large enough to include important interests but sufficiently small to enable easy operation by its expert members on difficult policy issues.

Such a model could be introduced to handle practical matters of direct action affecting both large and small states, in preference to ungainly plenary methods or direct control by the powerful Council. Veto powers should be avoided in the establishment of such a committee, as the combative example of the UN Security Council is one which should be avoided wherever practical, but politically delicate resource-based decisions require to be made. In order to make the body answerable to the members of ICAO as a whole, it would report to the Assembly through the Council.

In terms of resource allocation, the Commission could be charged with two complementary functions. The first of these would be to distribute a proportion of fund investment income (decided by Commission members) to development schemes in less developed nations, thus providing the much-demanded finance which the third world has long needed but rarely received. Second, remaining income would be allocated as research funds for advanced technological projects, tendering for which would be expected to be received predominantly from developed states and their corporations. A possible means of placating the minority of major aviation powers would be to specify that research funding would be given to states for distribution to

[89] The structure of the ETC, proposed by Kean and accepted by the ICAO Legal Committee Sub-Committee, envisaged the operation of a fifteen member Commission elected on a regional basis, serving for a period of three years. The standards produced would be subject to uniform application by those states accepting them. *LC/SC-MEX-REPORT, 19/1/90,* p. 15; *Draft Convention,* Article IV, in *LC/SC-MEX-REPORT, 19/1/90.*

their scientific and engineering agencies strictly in accordance with their financial contributions to ICAO. Hence, a state which contributed 25 per cent of ICAO's annual budget would have a right to call up to 25 per cent of the passenger levy fund's research allocation for its own projects, while a state with a membership assessment of only 0.06 per cent, could expect only a commensurate proportion for research. It should be emphasised, however, that as the distribution of aid-related finance would not be connected to budgetary assessments, even the smallest states could apply for large aid grants. In these ways both the numerical majority of ICAO's member states and the select grouping of important aviation powers would stand to gain financially from the existence of a levy fund. Nevertheless, the distinct possibility of states electing to dismiss the idea of a levy must still be recognised.

If an ICAO security fund were to be established, acquiring political recognition and the confidence of the international community, it might provide for the expansion of the ICAO mechanism's permanent airport inspectorate for global security verification. Security inspection by an intergovernmental agency is urgently needed on a large scale, because for too long airports have been treated by state authorities as though they are bus termini of no political significance. In the next century governmental attitudes to the industry must change, with airports and aircraft finally being recognised as vulnerable targets for politically motivated violence. Eventually, new attitudes to the security interests of the industry might even result in greater international regulation by a permanent authority, with standards and recommended practices for airport security acquiring an obligatory character in place of their currently non-binding nature.

In a world comprising diverse sovereign entities, it would be over-ambitious to hope prematurely for compulsory powers of inspection and mandatory upgrading of security on pain of economic sanctions, although just such a scheme of action has been proposed in the past.[90] Initially, a more determined consensual approach to standardisation of, for example, the two vital areas of security screening implementation and staff training, would represent a useful foundation on which to build future progress in the form of well-defined, enforceable and monitored standards. ICAO's concern for these two issues was demonstrated when, in 1989, an internal report to the 27th

[90] *International Security Review*, January/February 1990, p. 9. McWhinney has also made the following suggestion concerning the application of international sanctions:

> "Preventive private commercial sanctions of this sort, directed not merely against delinquent states that actively sponsored or sheltered aerial pirates, but also against those that simply failed to apply control measures in robust fashion, have always been recognised as part of the defence armoury available to the "special legal community" of the Air against aerial piracy. Why not use them against states guilty of omission-failure to exercise due care and foresight?" McWhinney (1987), p. 124.

Session of the Assembly made the following comment on the need for more flexible financing of security upgrading:

> "During their deliberation on this subject, the Council and the Committee on Unlawful Interference particulary emphasised the two aspects of aviation security, that is implementation and training, as the basic and immediate needs of States."[91]

A broadly supported security authority, financed from a variety of sources, would be an ideal body to instigate work on this area, because it would have guaranteed levels of income to enable it to produce standards which would require monetary outlay internationally. Airlines might justifiably be reluctant to support passenger levies because of the administration and expense which they would incur and, more importantly, in case a fare increase were to cause demand for air services to decrease, causing profits to be eroded. Evidence from a poll undertaken by IFAPA in conjunction with *Interavia Aerospace Review*, however, indicates that the travelling public would value the opportunity to contribute to the improvement of security. Not only did 84 per cent of responding passengers state that they would be willing to pay the IFAPA levy, but of that proportion exactly 25 per cent claimed that they would be prepared to pay up to four dollars extra and the remaining 75 per cent noted willingness to pay even more.[92] (In view of such support possibilities, a strong case could be made for proposing a levy well in excess of one dollar, with the intention of addressing a greater range of security problems with greater directness.) An excerpt from the results of the poll are reproduced below.

TABLE 8.2.

EXTRACTED RESULTS OF SECURITY POLL UNDERTAKEN BY IFAPA WITH INTERAVIA AMONGST FREQUENT FLYERS IN EUROPE AND THE USA: APRIL - MAY 1989[93]

QUESTION	OPTION	TOTAL (%)
Would you be willing to pay a nominal security levy on your air tickets for a special fund administered through the International Civil Aviation Organization to develop hi-tech detection equipment, improve training, monitor airport security	YES	84
	NO	16

[91] ICAO Working Paper *A27-WP/64 EX/19 12/7/89*, paragraph 2.1.

[92] *Results of Security Poll Undertaken by IFAPA with Interavia Amongst Frequent Flyers In Europe and the USA*, April-May 1989, p. 1.

[93] The poll was conducted in April/May 1989 in Europe and the USA with 5000 frequent fliers polled. European countries included Belgium, Denmark, Finland, France, Federal Republic of Germany, Greece, Holland, Ireland, Italy, Norway, Spain, Sweden, Switzerland and UK.

procedures and generally upgrade security in all of the world's airports in a way which will not slow down passage through controls?		
If yes, how much extra would you be willing to pay?	$1-4	21
	$5-9	37
	$10+	26

Number of replies: 1220

Such evidence is not absolutely conclusive with regard to true passenger preferences, but it cannot be denied that the survey result indicates at least a concern on the part of a statistically valid cross-section of business travellers to find a swift solution to aviation security's problems. This concern is heartening because it suggests very clearly that if passengers were to be demonstrated the practical benefits which could flow from the levy, public confidence in aviation could be expected to increase, in turn positively benefiting carriers and airports.

8.9. Conclusion

IFAPA's proposal represents a difficult strategy which could never provide a miracle cure for terrorism - hijackings and acts of sabotage will continue despite the best preventive and deterrent measures adopted to defeat them. A security fund, however, would act both as a starting point and a sign post for the industry's long march to sufficiency, encouraging innovative and practical solutions where now only intractable problems are to be found. First, however, governments and the aviation community must be made convinced of the levy's role, which in turn must involve authorities making a potentially humiliating public admission, either tacitly or openly, that aviation remains vulnerable and requires urgent action to reinforce it.

Governments' stubborn refusal to recognise the extent and severity of present crisis conditions should not justify the luxury of inaction or the false economy of third rate airport security measures. If they hold a passenger security levy to be unworkable, let them propose a more suitable, operable and financially adequate alternative. Reluctance to do so can only imply continuing state apathy. A great deal of discussion within and between governments and throughout the aviation industry would be required before a security fund could be set up, yet the beauty of a passenger-financed system is that multi-million dollar projects could be undertaken without reliance on governmental resources and at only negligible cost to passengers. Whether governments would be prepared to witness the development of a privately-inspired and passenger-financed initiative with unprecedented scope for security enhancement remains a moot point. Until it can be resolved, organisations such as IFAPA are entitled to remain sceptical about governments' true priorities:

> "The passenger may not mind paying his fair share, but he might wonder why governments are able to ignore international conventions they have signed to prevent criminal acts against

civil aviation and to punish those responsible."[94]

[94] *Plane Facts*, June/July 1986, p. 2.

CHAPTER 9

GENERAL CONCLUSIONS

> "It all depends on how far States see an advantage in allowing, and are prepared to allow, certain matter solely within their own criminal jurisdiction to be a subject of international treaty regulation. It is all a question of *will* on the part of States. If they have the will, they can do anything. But unfortunately, for reasons which are only too well known, there is not always such will."[1]

> "The conclusion to be drawn when considering the fight against terrorism is no novelty. International terrorism can be suppressed only through international cooperation. It must be consistent and openly declared. It must be seen. It must ignore and raise itself over national 'selfish' interest. Theoretically, but also practically, Western states can afford to do it. Do they really wish to?"[2]

9.1. The Future of the Hague Formula

Without doubt, domestic and international legal mechanisms have played and will continue to play a useful and necessary role in preparing states for the task of harmonising their criminal justice systems to enable such measures as rendition and prosecution of suspects and punishment of convicted offenders to take place. This preparatory and regulatory framework should not, however, be construed as a viable form of "suppression" in the most complete sense of the term, because of air crime's identity as an offence grouping in which the most serious, most threatening and most insoluble forms of activity (that is, politically motivated violence) are also those which are least likely to be deterred through any resort to law. Suppression of the crimes concerned will be, at best, incomplete. Murphy has correctly commented:

> "The effectiveness of these global conventions as antiterrorist

[1] Cheng in Cheng and Brown (eds.) (1989), p. 45.

[2] N. Gal-Or, "The Pendulum of Arab International Civil Transportation Terrorism," *The 1986 Annual of Terrorism* (1987) p. 188.

measures is questionable."[3]

After the collapse of the US-led Rome Conference in 1973, Bell correctly noted:

> "The U.S. effort to eliminate "safe havens" was based on the assumption that once the terrorists knew they would be prosecuted in all cases, terrorism would stop. This presumption ignores two realities. First, in many cases terrorists are so fanatically dedicated to their cause that they are fully prepared to accept capture. The second reality facilitates this inclination: imprisonment of terrorists occasions follow-on action to free those in jail."[4]

As has been observed above, processes of intended criminal deterrence can only acquire meaningfulness when applied to situations in which possible offenders are compelled to abandon their offence plans or are convinced that the formulation of such plans should not be attempted. The legacy of politically-inspired hijackings, aerial sabotage incidents and airport attacks which has been handed down throughout the 1970s and 1980s, as though in spite of ICAO's suppression efforts, indicates that the most ruthless aviation terrorists form one small, but important, category of air offender for whom the prospect of detection, capture and punishment holds little or no suppressive value. For a small number of terrorists, the possibility even of death itself is not enough to dissuade them from violence.

It is a fair comment that genuine improvements in rendition efficiency and in the willingness of governments to cooperate on legal and political levels to isolate terrorists, their organisations and their state sponsors, would probably result in a reduction in terrorist activities against aviation and its users. As justification for this assertion, it should be remembered that the world has benefited from the implementation of the Hague formula against apolitical offences and could, in theory, gain from a progressive development of its norms, in the direction of terrorism suppression.

For this reason, it is vital that the forms of progress promoted by ICAO and other bodies be encouraged and accelerated and that new and imaginative methods of improving cooperative efforts be attempted by the international community. At the same time, it is important to admit that practical limitations on the extent and effectiveness of cooperation and the scope of the legal subject matter dealt with may exist. ICAO and its member states have not yet demonstrated an ability or willingness, in practice, to come to terms with the nature of terrorism suppression or with the cooperative efforts which might start to influence its exponents.

[3]J.F. Murphy. "The Future of Multilateralism and Efforts to Combat International Terrorism." *Columbia Journal of Transnational Law*. 35 (1986) p. 44, in M. Crenshaw, *Terrorism and East-West Cooperation*, conference paper, ISA/BISA Joint Conference, London 1989, p. 2.

[4]Bell (1975), p. 1340.

Indeed, if the experience of the state actors in the Kuwaiti hijacking of 1988 can be used as a yard-stick for the limitations of practical consensus within the international community, the rigid limits to cooperation which some states impose in their dealings over aviation terrorism must be recognised as a central - and possibly constant - element in problem-solving processes. In short, the world underestimates at its peril the practical inability of such states as Algeria to enter ICAO's conventional regime and of the regime's signatories to find solutions to all offence types encountered.

A pragmatic recognition that universal adherence to the *aut dedere aut judicare* doctrine is almost certainly neither viable nor particularly desirable, would assist states in coming to terms with the reality of a current, two-pronged problem. The problem in question is that the international standards which were hoped by many of their framers to be workable, suppression-oriented remedies for all types of air crime either have not operated in some cases or else have not been permitted to operate to suppress a large number of the most important form of incident within their purview. In either case, it is reasonable to take issue with IATA's understanding of the ICAO family of agreements as "the legal basis for the security of the international civil aviation system",[5] noting instead that it can act as the basis for states to evade their moral duties of care towards airline passengers. If aviation is to be made secure, a much more practical form of suppression-based cooperation will be required to supplement existing schemes.

The determination of politically-motivated air offenders is unlikely to decrease in a world in which intergovernmental cooperation on aviation crime is seen to be impoverished. Furthermore, it is well established that the control of terrorist crimes through expensive, practical cooperation is a low priority for many, if not most, states.[6] It has also been remarked that true universalisation, meaningful improvement and workable enforcement of the norms are unlikely to take place, except in the long term, through the slow and uncoordinated accretion of individualised standards and through the unpredictable, unregulated and often unprincipled adaptation of each state's own practice in the field. Hence, while retaining an open mind on the issue of states' future courses of action, it is not unreasonable to conclude that the doctrine of *aut dedere aut judicare* will always need practical, as well as legal, reinforcement.

9.2. National Aviation Security Initiatives

Wilkinson has correctly suggested that states' national policies on security form the "building blocks" with which global protection can be constructed.[7] It is obvious that multilateral cooperation on security can best be effective only after firm policies, clear delineations of authority and rigorous procedures have been implemented at the domestic level. Equally, of course, the role of

[5] IATA, *Public Relations Backgrounder* (Montreal: IATA, 1987), p. 3.

[6] Cheng in Cheng and Brown (eds.) (1989), p. 37.

[7] Wilkinson (1989) I and II.

regional bodies such as ECAC can be vital by acting as fora in which states can inform their neighbours of progress made and difficulties encountered. In such ways, national policies can be made to coordinate with those of other compatible states, so forming a framework of independent but parallel policies.

While such organisations have a considerable and vital coordinating role to play in the context of regions containing economically developed, and thus broadly similar, states, a major problem is encountered when dealing with less developed nations. It is difficult for security standards to be made a priority in states suffering from liquidity difficulties or labouring under enormous external debt. Therefore, active coordination of progress must be less easily achieved, first requiring a degree of resource injection to raise security standards.

It should be emphasised, however, that while grants and soft loans should be offered to the poorest governments by those states able to afford them, supplying financial assistance and technical packages alone cannot suffice. In addition, security "know-how" must be conveyed if future generations of security staff are to be educated in their home countries. Managerial skills must be instilled in those with responsibility over airport systems, with intelligence skills, technical expertise and negotiating capabilities each requiring detailed examination. Above all, the administrative muddles which have afflicted developed nations' security processes must not be allowed to develop in newly emerging security-conscious LDCs. In effect, they must be assisted to establish their own national security programme and to promote simple lines of communication between domestic and external agencies. ICAO and IATA each have useful roles to play in transforming security systems in future. It is to be hoped that the expansion of these organisations' support activities will continue in future, permitting greater action to reinforce third world states' domestic policies.

9.3. The Need for Improved International Regulation

It has been stressed above that in the interdependent international civil aviation community, global cooperation must represent more than a useful option by which certain difficulties can be discussed. The universal approach to security standardisation is essential because nothing less can prompt governments to make the changes required for the increased safety of passengers and crew.[8]

[8]Note that economic factors can act to inhibit states' unilateral decision-making processes. When the US legislature was debating the geographical extent of an in-flight passenger smoking ban, Congress extended its coverage only to domestic flights, because it was realised that in the absence of multilateral discussions, travelling smokers would be likely to desert US carriers for foreign airlines which had no such restrictions. *The Glasgow Herald*, Saturday 30 June 1990, p. 7. A similar situation with security regulation could easily be present throughout the world - a prospect recognised by at least one senior airline executive, quoted in President's Commission (1990), p. 35.

The history of air crime suppression testifies to states' constant inability and/or unwillingness to introduce means of enforcement to regulatory structures and standardising norms concerned with criminal justice and security. Not only did the efforts of the 1973 Rome Conference and the "Summit Seven" fail to produce workable sanctions provisions, but the provisions of Annex 17 and other international "rules" on airport security remain nothing more than guiding exhortations. It is an inescapable fact that legislation, be it domestic or international, acquires effectiveness in general accordance with the extent to which it can be brought to bear against those who breach its provisions. The lessons of the 1970s from ICAO's air crime conferences, coupled with the continuing inability of states to bring a sufficiently high proportion of terrorist offenders to justice, highlight the grave difficulties which exist in either attempting to use current standards as intended or encouraging non-conforming states to adhere against their will. Despite a readily identifiable need to pursue progress in this direction as a long-term goal, efforts at enforcement should also be directed towards the imposition of adequate preventive capacities.

Although the current global conditions in which the international aviation community is forced to operate clearly indicate that a crisis of air terrorism requires to be addressed with urgency, no signs exist which would suggest that governments are closer to realising a need to seek the promulgation of enforceable standards on aviation security issues. Indeed, if a humanitarian and political calamity of the dimensions of the Pan Am Flight 103 disaster has failed to shake authorities out of their naïve ambivalence, then it can validly be predicted that terrorists will be required to perpetrate acts of unprecedented, grotesque violence before any realistic policy change by states and the industry can be expected. Nevertheless, options in enforcement should be considered at this point, as governments might, at some stage in the future, be forced to reconsider the state of the world's security provision and so might seek means by which to enforce minimum security standards against those nations which fail to maintain adequate preventive control against air crimes.

How any enforcement mechanism on aviation security could operate in a divided world remains a difficult problem. Formal notions of global tribunals at which negligent authorities would be brought to account for their failures may be attractive propositions but they cannot be regarded as viable short-term options. Using poor security as a criterion for sanctions imposition would not likely meet with success within existing structures such as ICAO or even the "Summit Seven", despite US unilateral security sanctions having been successful in drawing public attention to the poor condition of security at Athens airport in 1985.[9] Paradoxically, the considerations of power and sovereignty which ensured the US Administration of success in punishing Greece in the decentralised context of unilateral sanctions imposition would probably operate to discourage entry to any cooperative, centralised body designed to rule against states operating inadequate security systems.

While Clutterbuck is correct to note that the seven industrialised

[9]Brenchley (1986), p. 12.

powers (which together control 80 per cent of the "western" world's air traffic) could unite to promote the introduction of worthwhile procedures, in so doing taking with them many other interested parties,[10] it is hard to deny that these same powers have been reluctant to extend radically the scope or improve upon the capacities of their dormant Bonn Declaration, even when faced with annual opportunities to do so. Had the "Summit Seven" demonstrated any determination to implement its existing machinery against hijack havens and state sponsors of terrorism, it might have been more appropriate to have assessed the chances of their extending the Bonn framework to cover simple, apolitical cases of technical negligence by the criminally blameless. Current international conditions serve to keep such a structure of organisation and activity off the agenda of the powerful nations.

9.4. A New Aviation Security Forum

The decentralised "organisation" of international aviation security has failed to keep ahead of advancing threats.[11] An imaginative, but operable, course for future action might be to regard the integrity of aviation as a global priority and so to place the regulation of security under the legislative and executive control of the international community, via a permanent, standing committee on security. By developing this idea in the form of a new universal authority armed with certain powers to enforce its own security standards, a means might eventually be found of introducing the proposal in a practical way. In place of current exhortations and recommendations framed by ICAO's Aviation Security Panel, a more formal regime based on obligatory norms might be developed in the long term to set aviation security on a proper footing for its future enhancement.

Earlier references to the possibility of an ICAO Aviation Security Commission being established dealt only with prospects of it carrying out existing competences of the Committee on Unlawful Interference and new resource redistribution activities. Were any such Commission to prove successful in executing its responsibilities and so gain the respect of member states as a whole, scope might exist for it to assume more important, rule-framing, monitoring and enforcement roles. In the broadest of terms and, for the present, ignoring the inevitable practical difficulties which would threaten the success of the proposals, an ICAO Aviation Security Commission could be empowered to make highly specific security regulations whenever necessary and on a permanent basis. Hence, the static, reactive nature of international regulation could be overcome by the introduction of a rule-making authority capable of presenting necessary rules quickly and of providing financial support from the passenger levy fund for states unable to pay for resultant security changes.

[10] Clutterbuck (1990) I, p. 77. See also Clutterbuck (1990) II, pp. 144 and 150.

[11] As evidence for this, note that ICAO enacted new standards on baggage reconciliation two years after the Air India disaster which had demonstrated an urgent need for reform in the area. President's Commission (1990), p. 38.

Any form of norm enforcement requires an efficient scheme of regulatory monitoring. An ICAO aviation security monitoring team could be instituted by the proposed Commission to carry out routine inspections of all airports with the capacity to make unannounced spot checks - a practice currently deemed unacceptable under existing ICAO and IATA inspection schemes. Reporting confidentially to the Commission, the team could recommend action required to be taken to remedy any deficiencies found at any site visited. The Commission could be given the option of ratifying the team's findings and requiring reforms to be implemented or, if persuaded by submissions from the state in question, of moderating the team's recommendations or of rejecting them completely.

It is pointless to suggest that any international authority dealing with aviation security would ever be likely to be entrusted with workable powers to impose economic sanctions - the prerogative of sovereign states and of the most important of supranational bodies. For the international community to do so would be a reckless venture which would only invite disunity within itself. For constituent states to permit an authority such swingeing powers might be construed as a blatant form of corporate masochism, bearing in mind the scope which would exist for findings of security inadequacy to be made, even at more advanced airports.

In more general terms, and notwithstanding the current discussion of theoretical enforcement possibilities for the future, it seems entirely unlikely that any global security enforcement initiative resting upon the use of such sanctions could be successful, simply because entry to it would rest upon consensual means. No state would be likely to wish upon itself the prospect of its security being placed under expert scrutiny and the subsequent possibilities of public ridicule and passenger abandonment. Even the most important of aviation powers distance themselves from the needs of regulating the industry, relying on the inexactitude of Annex 17 to protect their carriers from justifiable accusations of security inadequacy. These powers would wish instead to be free of all external scrutiny which might probe at the weaknesses known to lie close beneath their thin veneer of respectability. This should not be taken to mean, however, that no internationally applicable sanctions are foreseeable in the event of security negligence.

9.5. An International Publicising System

A simple, but potentially valuable, enforcement mechanism could be contained in the threat or use of published warnings against a particular state's airports or carriers. A weapon of great power but simple operation would exist if the proposed Commission were armed with the powers to persuade authorities that security was in a poor state, to demand action for its improvement and, in the last resort, to condemn publicly aviation interests which refused to take the steps necessary to raise standards of security wherever required. Public blacklisting of an airport is a serious and potentially dangerous step for any authority to take because of the commercial effects on the state in question and the risks of alerting attackers to the existence of easy targets. Nevertheless, when threatened, it can have beneficial effects in the short term without requiring further coercive action. On rare occasions when threats were to fail to bring

about desired changes, publicising details of weak airport security could be construed as being nothing short of a valid public service, designed to draw travellers' attention to a hazard worthy of avoidance.

This policy has already been adopted unilaterally by US authorities in accordance with the airport inspection programme established in its Foreign Airport Security Act.[12] If FAA inspectors checking foreign airports' security provision determine that faults exist, warnings may be issued to authorities concerned, with the expectation of immediate improvements being instituted and of the problems being solved in the short term. In April 1986, Deputy Secretary of State Whitehead reported that no formal warnings had been issued under the Act, but that inspectors had identified areas for improvement in a variety of states, which had been rectified following "strong, though discreet, FAA and Embassy representations."[13] Other useful powers concerning curtailment of air services and public blacklisting of airports are contained in the US Foreign Assistance Act, 1985 and the International Security and Development and Co-operation Act, 1985.[14] There would be no reason to prevent other states or private sector bodies commanding public respect by publicising serious security faults wherever evidence of them was overwhelming and a clear public interest could be argued.[15] AOCI has noted that such a means of enforcing security might be very effective.[16]

In the absence of any clear desire on the part of the international community to take upon itself the roles of standard setting, monitoring and enforcing, possibilities definitely exist in the short term for hegemonic control to take place by any major aviation power prepared to risk the possible consequences of forcing standards to rise. Since the Pan Am atrocity of December 1988, the FAA has demonstrated a willingness to dictate terms of security to foreign aviation authorities without prior consultation, a variety of demands

[12]For a detailed description of the operation of the US inspection scheme, covering 247 airports in 99 states, and of its attempts at international cooperation generally, see President's Commission (1990), pp. 28 - 39.

[13]Whitehead (1986), p. 3.

[14]These powers have been employed against such airports as Manila, between May and September 1986, and Athens, between June and July of the same year. In both cases, the publication of advisory notices forced authorities to make security a vital, economic priority. Dawson, (1986) II, p. 27 - 28; Cheng in Cheng and Brown (eds.) (1988), p. 51.

[15]Note that from 26 September 1990, the British Secretary of State for Transport was granted new powers to enforce security regulations against negligent or reckless operators and airports. Among these powers is the ability to close an unfit airport until security weaknesses have been rectified. Press release from Department of Transport, September 1990.

[16]Nelms (1989), p. 692.

having been made by it for implementation by foreign authorities.[17] The most keenly contested of these measures was a requirement for all foreign airlines to submit details of their national security programmes to the FAA in 1989. If the FAA found that the programmes did not meet its standards, it could demand alterations to them, with aviation sanctions being one possible outcome in the event of ultimate inadequacy. Transportation Secretary Skinner justified this by stating that it was intended:

> " ... to ensure that the 111 foreign airlines currently serving US airports have adequate security measures to protect civil aviation against criminal acts of violence."[18]

The dangers of such a course being adopted include the problems posed by alienating otherwise close aviation partners. IATA's Rodney Wallis has described the FAA policy as being "extra-territorial rule-making" and has noted that many states upon which the requirement was imposed were angered that the requirements were not made to apply to US carriers.[19] The British and French governments also fear that national sovereignty will be challenged. with the British Department of Transport claiming in 1989 that only limited support can be expected by the FAA.[20] More important for any hegemonic power is the possibility of needing to assist states incapable of raising their security standards unilaterally. However, if adequate resources can be provided as security aid packages. the hegemonic route to reform might be one of the most direct. Already the FAA has offered to provide states lacking any formally documented security programme with a standard form version to act as a starting point for further development.[21]

9.6. Prospects for More Stringent Monitoring

It is to be predicted that in the wake of the post-Lockerbie transfers of Ray Salazar and Frank Burns (two senior aviation security representatives of the FAA moved into other less prominent positions) and the publication of the highly critical President's Commission Report in 1990, the FAA will have no choice but to enforce a higher level of security on other states with airports served by US airlines and/or with services flying to the United States. Fear of adverse publicity and of professional dismissal should motivate remaining FAA security staff to tolerate fewer weak spots. Regrettably however. such considerations of tension and unease cannot be condusive to the promotion of good working relationships with overseas partners. If security standards and cooperation are not both to be impaired in future, the FAA must find a way of proceeding in a forceful but diplomatic way, in its dealings with external governments.

[17] Wallis, *Beaumont Memorial Lecture*, (1989).

[18] *Jane's Airport Review*. June/July 1989, p. 9.

[19] *Ibid.*, p. 40.

[20] Norris (1989), p. 694.

[21] *Jane's Airport Review*. June/July 1989, p. 9.

A piece of US legislation which displays a willingness to lead other nations unilaterally where multilateral initiatives have failed is the International Security and Development Co-operation Act, 1985 (mentioned above). This law has reduced questions of economic sanctions imposition and other forms of direct action to a domestic decision-making level. Under Section 503 (a)(2) the President is given wide powers to act against any government which "supports international terrorism", while Sections 501 and 502 establish an anti-terrorist assistance program, with Section 504 specifically placing a trade embargo on Libya. In addition, Sections 506 and 507 call for a renewal of international activity to combat terrorism and Section 1115(a)(1) orders the US Secretary of Transportation to assess:

> " ... the effectiveness of the security measures maintained at those foreign airports being served by air carriers, those foreign airports from which foreign air carriers serve the United States, those foreign airports which pose a high risk of introducing danger to international travel, and at such other foreign airports as the Secretary may deem appropriate."

If these standards do not comply with the rather lax provisions of ICAO's Annex 17, the President may, under the terms of Section 1115 (e) (2) (D) of the Act, prohibit air carriers from flying between such airports and the United States. In 1986, FAA inspection teams visited approximately 300 foreign airports for the purpose of inspection.[22] A measure of the Bush Administration's concern for monitoring standards of security may also be gauged from the fact that in 1989 the FAA announced its intention to increase by 35 per cent the number of security inspectors in its employment. As a result, in a twenty month period, the inspectorate's workforce was set to rise to 670 persons.[23]

The weakness of the executive power involved is to be found in the inability of Annex 17 to provide adequately high levels of guidance for the President on the question of security standards. For this reason, a review and radical upgrading of its terms should be made by ICAO, so that its example might be a useful one for states and its standards might be reasonable guides for legal purposes.

9.7. Public Pressure

It is possible that a wave of public outrage might precipitate admissions of inadequacy from the authorities which regulate security activities, in turn forcing states to consider binding enforcement measures. The institution of the European Court of Human Rights and other agencies empowered to make findings against the states which established them and to force changes to be made in domestic policy and legislation illustrates the possibilities which exist for the establishment of such useful fora, whenever fundamentally important questions of state behaviour cannot be avoided by governments.

The difficult process which would be required to bring about such a

[22] W.A. Crenshaw (1987), pp. 82 - 83.

[23] *Jane's Airport Review*, February/March 1989, p. 2.

reversal in municipal attitudes to security would entail convincing first the public, and then governments that aviation terrorism is an abomination equivalent to genocide, slavery or torture. This, itself, would need responsible governments to review their policies and attitudes towards political offence exceptions to rendition and support for states and organisations which promote the use of terror as a political instrument - a requirement which has always proved a stumbling block to the advances of terrorism suppression. In short, progress can be expected to be as slow and erratic as it has ever been on these questions.

One means by which authorities might be encouraged to increase the pace of reform is the use by concerned sectors of the international aviation community of economic boycotts. Resort to such an open use of economic pressure might be made to mirror the successful practice of the International Federation of Airline Pilots Associations (IFALPA) which on June 19 1972 mobilised both public opinion and the ICAO Council by its members' twenty four hour global flight boycott, in protest against an increasingly difficult threat posed to aviation by terrorist groups and by governmental inaction to promote enforcement of the *aut dedere aut judicare* standards.[24] Several writers have also drawn attention to the success of IFALPA merely in threatening strike action in the case of an El Al aircraft, crew and passengers detained in Algeria in August 1968.[25] Such focussing of international attention upon the actions of the state was sufficient to secure the releases sought. Moreover, the Federation has also successfully applied unpublicised pressure to motivate certain states to introduce improved security measures.[26]

Similar publicity-seeking activities were proposed to IFALPA after the TWA sabotage of 2 April 1986, though these options were rejected, perhaps because of fears of possible legal consequences for striking pilots.[27] If such fears are allowed to override temptations to become involved in political processes, a useful method of forcing change via

[24] O'Donnell (1973), pp. 990 - 992. See also Bell (1975), pp. 1334 - 5; Evans (1973), p. 670; Fenello (1973), p. 1066; McWhinney (1987), pp. 51 - 52 and pp. 74 - 76. It has been observed that the 24 hour work stoppage succeeded in promoting greater intergovernmental activity even although court injunctions within the United States severely limited the scope of the strike. Troncoso Cortés (1973), p. 568.

[25] Wilkinson (1986), p. 257; McWhinney (1987), p. 27; and R.L.S. McKeithen, "Prospects for the Prevention of Aircraft Hijacking Through Law," *Columbia Journal of Transnational Law* 9 (1970), pp. 73 - 76.

[26] M.S. McNeil, "Aerial Hijacking and the Protection of Diplomats." *Harvard International Law Journal* 14 (1973), p. 598.

[27] McWhinney (1987), p. 28.

the private sector will have been lost.[28] In future, cooperation with other organisations and pressure groups within the industry might produce even more dramatic results for the enforcement of the legal regime or for the strengthening of security. Clearly, much untapped potential remains for this mode of international self-help, for as McWhinney has stated in connection with what he terms the Federation's "reserve control":

> "By and large, ... IFALPA's potential to curb or control the hijacking problem seems hardly to have been used to the full. With a membership of 44,000 pilots in 54 countries, IFALPA's ability to mount a crippling, if not necessarily complete, boycott against a delinquent State is clearly there, as was demonstrated in the Algerian case in 1968."[29]

9.8. An International Civil Aviation Security Strategy

In addition to the possibilities of the industry imposing economic pressures on states to precipitate change, it is foreseeable that less developed countries might adopt a more aggressive attitude towards bringing about reforms in the existing security deployment patterns which have resulted in such a low level of preparedness in many states. A strong argument can be made to the effect that the conduct of international civil air services between rich and poor states has been undertaken with scant regard to the resource requirements of the economically less advanced partners.

Such circumstances should not be tolerated by the industry, not least because of the interdependence which characterises it - if existing structures are weak, both rich and poor states will suffer. The economic inequalities which exist, constraining progress towards greater security development for the poorer actors in the international system, ensure that in the absence of a dedicated international assistance initiative, enhancement of existing standards will be hard won. Nevertheless, a factor of equality in this public international dimension can be found in the form of the legal sovereignty which characterises all states irrespective of wealth, size or influence and which entitles each to enter into international agreements and thereafter to rely upon their terms.

The 162 parties to the Chicago Convention, 1944[30] have agreed, under the terms of Article 1 and subject to certain clearly defined exceptions, that each state has "complete and exclusive sovereignty over the airspace above its territory". Article 6 utilises this provision to establish (once more with provisos) that the operation of scheduled international civil air services can only take place

[28] Although, note the determined lobbying by the Swedish pilots' union for the extradition from Sweden of a 17 year old suspected hijacker in June and July 1990. *Soviet Weekly*, 28 June 1990 (photocopy); *The Scotsman*, Thursday 12 July 1990 (photocopy).

[29] McWhinney (1987), p. 75.

[30] As at January 1990. M. Dixon, *Textbook on International Law* (London: Blackstone, 1990), p. 92.

within a state by a carrier of another if the host state expressly permits that activity. Hence, a valuable measure of equality is ensured for all states, which are empowered to discontinue air services with other parties on serving notice of intention to do so. It was this power which enabled the "Summit Seven" to contemplate boycotts under the Bonn Declaration and which could provide for a different form of collective action by LDCs in future.

It is foreseeable that at some future stage, many third world states might be keen to introduce a higher quality of airport security than is currently available. This enthusiasm for reform might be catalysed by, for example, a realisation, following the appearance of a trend towards air crime commencing in developing nations, that action must be taken to strengthen security on a global basis. If security development was sought by a third world state or its carriers but financial considerations precluded it, there would be nothing to prevent it from taking good advantage of its powers of sovereignty as declared in the Chicago Convention by seeking assistance from richer aviation partners, whose airliners fly into its jurisdiction. One means of achieving improvements within a state would be to draw up stringent security regulations contained within a comprehensive national security programme, with the expectation that foreign airlines and their states of registration would provide adequate resources for the upgrading.

Inevitably, any one sovereign state which aimed to use such a means of persuasion would meet with little success, as even the threat of service suspension by the poor host nation would be meaningless when viewed in the contexts of the economic benefits to be lost by terminating air commerce and of the other regional market opportunities available to a rich aviation power. If, on the other hand, a coalition of like-minded LDCs (as found in regional aviation policy conferences) were able to muster sufficient LDC group cohesion to present a determined bargaining posture towards richer nations, the costs of losing access to a wide range of developing markets would be raised dramatically for the aviation community of the richer world. This potential for the developing nations to disrupt existing resource structures led one "Summit Seven" state's chief public servant with responsibility for aviation security to remark to the current writer that the Chicago Convention now has the status of the most important international agreement influencing aviation security. He noted that major aviation powers are already being made to agree to their providing resources for security enhancement when periodic renegotiation of air services agreements becomes necessary with certain third world states.[31] There is little doubt that such a trend could evolve greatly in future, if only third world governments were motivated so as to act in concert and take advantage of their potentially impressive bargaining power.

9.9. From Global Ideals to Practical Realities

The creation of a new international aviation security order involving large-scale transfers of resources from richer to poorer nations and a new delineation of responsibilities throughout the international

[31] Interview with civil servant, Paris, France, 6 June 1990.

community could undoubtedly have serious consequences for governments accustomed to the pre-existing regulation in the field. Without well-argued justification being made by poorer nations for the redistribution of those resources, major states will continue to avoid enforcing security and providing aid to carry out reform. Instead, they will continue to prefer tolerating unacceptably high levels of aviation terrorism, avoiding all possibilities of global security structures being enforced via any inconveniently autonomous intergovernmental agency.

It is highly improbable that any systematic method of norm creation and enforcement via an international authority will ever be instituted by the international community because of the desire on the part of many states to hold fast to their individual regulatory rights within their own territories. Such subsidiary reasons for inactivity as expense and upheaval could be cited as factors contributing to states' unwillingness to take the initiative required to establish international mechanisms for the control of aviation security activities. Evidence of state ambivalence towards resolving difficult problems of regulation draws the observer to conclude that the predominant cause of governmental reluctance in the area is the satisfaction of most authorities with the existing municipally-based structure of norm creation and supervision.

Many states and certain sectors of the industry have a vested interest in preserving the *status quo* because without clear lines of responsibility being drawn and particularly in the absence of a conscientious overseeing body empowered to force the implementation of change, continuing freedom of action can only be encouraged. Moreover, while the current regime is permitted to exist, powerful sovereign states will have good reason for promoting the type of initiatives which are directed as much towards the enhancement of good public relations as of good security. For as long as responsibility for security errors can be passed from one agency to another without any being prepared or expected to admit fault, the various actors involved will evade liability internationally - though not necessarily domestically in courts of law.

9.10. Private Means of Enforcing Security

A valuable means by which security reform might be precipitated relates to action taken by passengers against carriers and authorities, the negligence of which can result in acts of aviation violence being allowed to be committed. If states' efforts to motivate change in industry-related policies fail to result in adequate progress being made, consumers of air services might be tempted to use legal measures of self-help. In addition to promoting public abandonment of high-risk routes, airports and carriers, and to leading boycotts of dangerous or negligent services in the style of IFALPA in the 1960s and 1970s, resort to civil courts could make the less concerned members of the industry take note of security inadequacies. Litigation would always require to be premised on the need to overcome the restrictions of the Warsaw Convention 1929, by seeking to show, for example, wilful misconduct on the part of a carrier.

In 1989 and 1990, civil actions were considered and commenced by some bereaved families of Pan Am Flight 103 victims. In particular, the

airline and its insurer received notiication that it would be sued for $300 million (US) in a wilful misconduct action relating to Pan Am's alleged failure properly to institute its Alert Security initiative in the latter half of the 1980s.[32] Without question, the possibility of courts enforcing such damages against a carrier and insurer would force the industry to reconsider security requirements. Although the financial penalties involved would not necessarily drive successful corporations to bankruptcy, the long-term effects on insurance premiums and the bad publicity derived from delicate evidence being drawn from executives in long court cases would each compound any monetary problems.

Additionally, victims' families might even consider security activities when determining the uses to which awarded damages might be put. In the above-noted case, the cartel of Flight 103 victims' families decided that any eventual award should be donated to a foundation for the promotion of world peace. An appropriate beneficiary of such moneys would be a privately organised airport security foundation, charged with the responsibility of disseminating interest payments to needy projects. The theoretical prospect of $300 million (US) or more being placed in trust for the improvement of global aviation security is an exciting one, not least because it would assist in suppressing the very form of crime which has caused the deaths of so many airline passengers. Ultimately, what states are reluctant to attempt, individuals might achieve through legal avenues and practical means.

9.11. Concluding Remarks

Meaningful reform of airport security is a project full of paradoxes. Reform is a requirement for the short term, the goals of which must be sought in the long term. It is conceived for the genuine protection of the industry and the public, some members of which may resent the painful labours necessary for its birth. It is intended to aid governments in their protection of global communications and their promotion of peace, yet several states will continue to ignore the extent of the predicament from which the industry must be rescued. Progress must be time-consuming, unpopular with many and costly for all, but the prospect of continued vulnerability cannot be countenanced. Instead, policy makers must be made to recognise that adequate airport security is a necessary insurance policy, the premium of which must somehow be paid, for the cost of airport security is truly a price worth paying.

The practicalities of introducing the changes required at airports now rely on the workings of politics, accurately described as the art of the possible. Contrary to the belief of some authorities, the challenge of security advancement is possible to meet in the contexts of time, democracy and economics. Cynics may deride systematic security reform as a politically untenable dream, yet constructive problem-solving efforts from bodies such as IFAPA have suggested that change could be effected where it is most urgently needed - at the political levels of organisation and finance. In future, aviation security enhancement should not be allowed to fall prey to the vested

[32] *The Independent*, Thursday 29 March 1990, p. 7.

interests of those politicians who would view the subject only as an irritating nuisance on which to practise their craft of compromise.

BIBLIOGRAPHY

Primary Sources

Abdul, D.Z. *Aviation Security (Management Aspects): Malaysian Experience.* Unpublished paper presented at International Aviation Management Training Institute Conference on Aviation Law and its Impact on Management. Bali, Indonesia, 10 May 1990.

Abramovsky, A. "The Constitutionality of the Anti-hijacking Security System." *Buffalo Law Review* 22 (1972/73): 123.

. "Multilateral Conventions for the Suppression of Unlawful Seizure and Interference with Aircraft. Part I: The Hague Convention." *Columbia Journal of Transnational Law* 13 (1974): 381.

. "Multilateral Conventions for the Suppression of Unlawful Seizure and Interference with Aircraft. Part II: The Montreal Convention." *Columbia Journal of Transnational Law* 14 (1975): 268.

. "Multilateral Conventions for the Suppression of Unlawful Seizure and Interference with Aircraft. Part III: The Legality and Political Feasibility of a Multilateral Air Security Enforcement Convention." *Columbia Journal of Transnational Law* 14 (1975): 451.

and P.L. Greene. "Unilateral Intervention on Behalf of Hijacked American Nationals Held Abroad." *Utah Law Review* (1978): 231.

Adams, J. *Trading in Death: Weapons, Warfare and the Modern Arms Race.* London: Century Hutchinson, 1990.

Africa, B. *Political Offences in Extradition.* Manila: Benipayo, 1926.

Agrawala, S.K. *Aircraft Hijacking and International Law.* New York: Oceana, 1973.

Air Transport Association. *U.S. Hijackings: The Major Cause and Cure.* Washington D.C.: Air Transport Association, October 1983.

. *Protecting Air Transport from Hijacking and Sabotage.* Washington D.C.: Air Transport Association, 1985.

Alexander, Y. and H.M. Levine. "Prepare for the Next Entebbe." *Chitty's Law Journal* 25 (1977): 240.

Amaral Nunes, J.L. do and L.J. Smith (Co-Rapporteurs). *North Atlantic Assembly Sub-Committee on Terrorism - Draft Interim Report.* Brussels: North Atlantic Assembly, 1987.

"Anti-Smuggling Cargo-Inspection Systems Developed." *ICAO Bulletin* 38 (October 1983): 24.

Atterton, H.K. "Security: IATA Steps In." *IATA Review* Issue 3 (1985): 3.

"Aviation Security Motivates World Assembly." *ICAO Bulletin* 41 (November 1986): 14.

Baldwin, D.A. "Bargaining with Airline Hijackers." In W.I. Zartman (ed.). *The Fifty Percent Solution.* London: Yale University Press, 1976, 404.

Bassiouni, M.C. "Symposium: Terrorism in the Middle East - Methodological Options for International Legal Control of Terrorism." *Akron Law Review* 7 (1974): 388.

. *International Extradition and World Public Order.* Leyden: Sijthoff, 1974.

. "Prolegomen to Terror Violence." *Creighton Law Review* 12 (1979): 745.

and V.P. Nanda (eds.). *A Treatise on International Criminal Law.* 2 vols. Springfield: Charles C. Thomas, 1973.

Bell, R.G. "The U.S. Response to Terrorism Against International Civil Aviation." *Orbis* 19 (1975): 1326.

Booth, M. "The Implications of 1992 for the Development of Airports." *Airport Technology International* (1989): 179.

Bowman, M.J. and D.J. Harris. *Multilateral Treaties: Index and Current Status.* London: Butterworth, 1984.

. *Multilateral Treaties: Index and Current Status - Seventh Cumulative Supplement.* Nottingham: University of Nottingham Treaty Centre, 1990.

Boyle, R.P. "Jurisdiction over Crimes Committed in Flight: An International Convention." *American Criminal Law Quarterly* 3 (1964-65): 68.

. "International Action to Combat Aircraft Hijacking." *Lawyer of the Americas* 4 (1972): 460.

Boyle, W.M. "Access Control: A Vital Link to Strong Airport Security." *Airport Technology International* (1989): 188.

Bozorgmanesh, H. *Concerning the Successes of Thermal Neutron Analysis as an Explosive Detection System.* Paper presented to the President's Commission on Aviation Security and Terrorism. Washington D.C., 2 February 1990.

Brenchley, F. "Living with Terrorism: The Problem of Air Piracy." *Conflict Studies* No. 184, 1986.

British Government. *Government Response to the Fourth Report of the Committee, Session 1985-86.* Edinburgh: HMSO, 1986.

Brodie, T.G. *Bombs and Bombings - A Handbook to Detection, Disposal and Investigation for Police and Fire Departments.* Springfield: Thomas, 1972.

Brower, C.N. "Skyjacking: Problems and Potential Solutions - A Symposium - International Enforcement of Air Security - United States' Initiatives." *Villanova Law Review* 18 (1973): 1020.

Brownlie, I. *Principles of Public International Law.* Oxford: Clarendon, 1979.

. *Basic Documents in International Law.* Oxford: Clarendon, 1983.

Buergenthal, T. *Law-Making in the International Civil Aviation Organization.* Syracuse: Syracuse University Press, 1969.

Bundeskriminalamt. *Getarnte Sprengvorrichtung, eingebaut in einem Radiorecorder.* Wiesbaden: Bundeskriminalamt, 1988.

Carew-Jones, D. "The Hijacking of KU 422: A Hostage's Account." *TVI Report* 8(3) (1989): 47.

Chaliand, G. *The Palestinian Resistance.* Baltimore: Penguin, 1972.

Cheng, B. "Crimes on Board Aircraft." *Current Legal Problems* 12 (1959): 177.

. "The Hague Convention on Hijacking of Aircraft 1970 - The Legal Aspects." *Aeronautical Journal* 76 (1972): 529.

and E.D. Brown (eds.). "Aviation, Criminal Jurisdiction and Terrorism: The Hague Extradition Prosecution Formula and Attacks at Airports." *Contemporary Problems in International Law: Essays in Honour of Georg Schwarzenburger on his Eightieth Birthday.* London: Stevens and Sons Ltd., 1988.

Chung, D.Y. *Some Legal Aspects of Aircraft Hijacking in International Law.* Ph.D. diss., University of Tennessee, 1978.

Churchill, R.R. and A.V. Lowe. *The Law of the Sea.* Manchester: Manchester University Press, 1985.

Clutterbuck, R. *Living with Terrorism.* London: Faber and Faber, 1975.

. *Guerrillas and Terrorists.* London: Faber and Faber, 1977.

. *Kidnap, Hijack and Extortion: The Response.* London: Macmillan. 1987.

. *Terrorism and Guerrilla Warfare: Forecasts and Remedies.* London: Routledge. 1990.

. *Terrorism, Drugs and Crime in Europe After 1992.* London: Routeledge. 1990.

Cooper, H.H.A. "Aviation: Soft Underbelly of the Corporate World." *Chitty's Law Journal* 28 (1980): 155.

Costello, D. "International Terrorism and the Development of the Principle *Aut Dedere Aut Judicare.*" *The Journal of International Law and Economics* 10 (1975): 483.

Crenshaw, M. *Terrorism and East-West Cooperation.* ISA/BISA Joint Conference paper, presented London, March 1989.

Crenshaw, W.A. "Terrorism and the Threat to Civil Aviation." Ph.D. diss., University of Miami, 1987.

Crockett, C.H. "Toward a Revision of the International Law of Piracy." *De Paul Law Review* 26 (1976): 78.

Dailey, J.T. "Skyjacking: Problems and Potential Solutions - A Symposium - Development of a Behavioral Profile for Air Pirates" *Villanova Law Review* 18 (1973): 1004.

D'Amato, A.A. *The Concept of Custom in International Law.* Ithaca: Cornell University Press, 1971.

Davis, B.O. Jr. "Skyjacking: Problems and Potential Solutions - A Symposium - The Government's Response to Hijacking." *Villanova Law Review* 18 (1973): 1012.

Dawson, H.G. "Hijacking and the Law." *Solicitors' Journal* 130 (1986): 735.

H.G. Dawson. "Civil Aviation, Hijacking and International Terrorism - An Historical and Legal Review" (New York: International Bar Association, 1986) photocopied.

Delafosse, J. "How Can We Protect Isolated Aeronautical Infrastructures?" *ICAO Bulletin* 41 (October 1986): 18.

Demographic Yearbook 1987. New York: United Nations, 1989.

Dinstein, Y. "Criminal Jurisdiction over Aircraft Hijacking." *Israel Law Review* 7 (1972): 195.

Dixon, M. *Textbook on International Law.* London: Blackstone, 1990.

Dobson, C. and R. Payne. *The Weapons of Terror: International Terrorism at Work.* London: Macmillan, 1979.

Dorey, F.C. "Conventions Alone Will Not Ensure Civil-Aviation Security." *ICAO Bulletin* 33 (January 1978): 18.

. "Airport Security: How to be Fruitful, Though Sterile." *ICAO Bulletin* 33 (1978): 37.

. *Aviation Security.* London: Granada, 1983.

. "Security at Airport Terminals." *Airport Technology International* (1988): 248.

Dowd, D.W. "Skyjacking: Problems and Potential Solutions - A Symposium - Introduction." *Villanova Law Review* 18 (1973): 985.

Dudley, C. "Hijacking and Terrorist Attacks Against Aircraft and Airport Installations." *Journal of the Insurance Institute of London* 65 (1976-77): 65.

Edwards, G. "Fragmented Security at British Airports." *Terror Update.* September 1989: 5.

Emanuelli, C. "Legal Aspects of Aviation Terrorism: The Piecemeal vs. the Comprehensive Approach." *The Journal of International Law and Economics* 10 (1975): 503.

Emerson, S. and B. Duffy. *The Fall of Pan Am 103.* London: Futura. 1990.

Europa World Year Book 1990. (2 vols.) London: Europa, 1990.

European Civil Aviation Conference. *Manual of ECAC Recommendations and Resolutions Relating to Facilitation and Security Matters.* Paris: European Civil Aviation Conference, September 1988.

Evans, A.E. "Aircraft Hijacking: What is Being Done?" *American Journal of International Law* 67 (1973): 641.

and J.F. Murphy (eds.). *Legal Aspects of International Terrorism.* Lexington: Heath, 1978.

Fact Finding Report on the Seizure of Kuwait Airways Flight KU 422 Bangkok: Airports Authority of Thailand. 1988.

Farhangi, L.S. "Insuring Against Abuse of Diplomatic Immunity." *Stanford Law Review* 38 (1986): 1517.

Feller, S.Z. "Comment on Criminal Jurisdiction over Aircraft Hijacking." *Israel Law Review* 7 (1972): 207.

Fenello, M.J. "Skyjacking: Problems and Potential Solutions - A Symposium - Individual Rights v. Skyjack Deterrence: An Airline Man's View." *Villanova Law Review* 18 (1973): 996.

Fenston, J. and H. De Saussure. "Conflict in the Competence and Jurisdiction of Courts of Different States to Deal with Crimes Committed on Board Aircraft and the Persons Involved Therein." *McGill Law Journal* 1 (1952): 66.

Fick, R.L., J.I. Gordon and J.C. Patterson. "Aircraft Hijacking: Criminal and Civil Aspects." *University of Florida Law Review* 22 (1969): 72.

Fingerman, M.E. "Skyjacking and the Bonn Declaration of 1978: Sanctions Applicable to Recalcitrant Nations." *California Western International Law Journal* 10 (1980): 123.

FitzGerald, G.F. "Recent Proposals for Concerted Action Against States in Respect of Unlawful Interference with International Civil Aviation." *Journal of Air Law and Commerce* 40 (1974): 161.

"Five Large Assistance Projects Announced." *ICAO Bulletin* 44 (May 1989): 31.

Flight Safety Foundation. "An Update of World Airport Security System." *Flight Safety Digest* November 1989: 9.

Foley, M.J. "The Antihijacking Act of 1974 - A Step Beyond the Hague Convention." *South Texas Law Journal* 48 (1975): 356.

Fordham, S. *High Explosives and Propellants.* Oxford: Pergamon. 1966.

Freedman, L.Z. and Y. Alexander (eds.). *Perspectives on Terrorism.* Wilmington: Scholarly Resources, 1983.

Freeman, N. "Aviation Security Training is a Necessity." *ICAO Bulletin* 34 (November 1979): 33.

Friedlander, R.A. "Terrorism and International Law: What is Being Done?" *Rutgers Camden Law Journal* 8 (1977): 383.

. "Banishing Fear from the Skies: A Statutory Proposal." *Duquesne Law Review* 16 (1977-8): 283.

. "Coping with Terrorism: What is to be Done?" *Ohio Northern University Law Review* 5 (1978): 432.

. *Terrorism: Documents of International and Local Control.* 3 vols. New York: Oceana, 1979-81.

Gallenschutz, T. "Access Security within Terminal Buildings." *Airport Technology International* (1988): 243.

Gal-Or, N. *International Cooperation to Suppress Terrorism.* Beckenham: Croom Helm, 1985.

. "The Pendulum of Arab International Civil Transportation Terrorism." *The 1986 Annual on Terrorism* (1987): 177.

Gaynes, J. "Bringing the Terrorist to Justice: A Domestic Law Approach." *Cornell International Law Journal* 2 (1978): 71.

George, B. (Rapporteur). *North Atlantic Assembly Working Group on Terrorism - Final Report.* Brussels: North Atlantic Assembly. 1978.

Gertler, J. "Amendments to the Chicago Convention: Lessons from Proposals that Failed." *Journal of Air Law and Commerce* 40 (1974): 225.

. "Custom and International Air Relations." *Annals of Air and Space Law* 10 (1985): 63.

Goodpaster, A.J. *et al. Combatting International Terrorism: U.S.-Allied Cooperation and Political Will.* Washington DC: Atlantic Council of the United States, 1986.

Gora, J.M. "Skyjacking: Problems and Potential Solutions - A Symposium - The Fourth Amendment at the Airport: Arriving, Departing or Cancelled?" *Villanova Law Review* 18 (1973): 1056.

Green, L.C. "Extradition v. Asylum for Aerial Hijacking." *Israel Law Review* 10 (1975): 207.

Griffin, M. "Diplomatic Impunity." *Student Lawyer* October 1984: 18.

Hammarskjöld, K. "About the Need to Bridge a Jurisdictional Chasm." *Annals of Air and Space Law* 8 (1983): 97.

Harris, D.J. *Cases and Materials on International Law.* London: Sweet and Maxwell, 1983.

Heller, P.P. "NZ Air Crimes Act: A First?" *Aviation Digest* December 30, 1972: 7.

Higgins, R. "The Abuse of Diplomatic Privileges and Immunities: Recent United Kingdom Experience." *American Journal of International Law* 79 (1985): 641.

Hill, R.E. "Airport Violence and the Legal Principle *Aut Dedere Aut Judicare.*" *Terrorism and Political Violence* 1 (1989): 78.

Hirano, R. "Convention on Offences and Certain Other Acts Committed on Board Aircraft of 1963." *University of Tasmania Law Review* 8 (1964): 44.

Hirsch, A.I. and D.O. Fuller Jr. "Aircraft Piracy and Extradition." *New York Law Forum* 16 (1970): 392.

Holyst, B. "The Abduction of Polish Airlines "LOT" Planes." *Violence Aggression and Terrorism* 3 (1989): 119.

Hoffman, B. *The Prevention of Terrorism and Rehabilitation of Terrorists: Some Preliminary Thoughts.* Rand Paper N705985, 1985.

. *Recent Trends in Palestinian Terrorism II.* Rand Paper N707685, 1985.

. *Shi'a Terrorism, the Conflict in Lebanon and the Hijacking of TWA Flight 847.* Rand Paper N711685, 1985.

Horowitz, I.R. "Can Democracy Cope with Terrorism?" *Civil Liberties Review* 4 (1977): 29.

Horvitz, J.F. "Update on Hijacking: Ineffectiveness of International Legal controls." *Chitty's Law Journal* 25 (1977): 88.

House of Commons Committee on Transport. *Fourth Report from the Transport Committee, Session 1985 - 86, Airport Security.* London: HMSO, 1986.

. *Third Report from the Transport Committee, Session 1988 - 89, Airport Security.* London: HMSO, 1989.

"How Should Airport Security Measures Be Financed?" *ICAO Bulletin* 36 (July 1981): 23.

Hughes, G.L. "The Law in Australia Relating to the Unlawful Seizure of Aircraft." *University of Tasmania Law Review* 6 (1978): 39.

"ICAO Actively Pressing World-wide Aviation Security Programme." *ICAO Bulletin* 37 (July/August 1982): 67.

Iqlarsh, H.J. "Fear of Flying: Its Economic Costs." *Terrorism* 10 (1987): 45.

International Air Transport Association. *Airline Security and Fraud Prevention.* Montreal: International Air Transport Association. 1987.

International Civil Aviation Organization. *Memorandum on ICAO.* Montreal: International Civil Aviation Organization. 1984.

. *ICAO Statistical Yearbook: Civil Aviation Statistics of the World 1988.* Montreal: International Civil Aviation Organization, 1989.

. *International Standards and Recommended Practices: Security - Safeguarding International Civil Aviation Against Acts of Unlawful Interference - Annex 17 to the Convention on International Civil Aviation.* Montreal: International Civil Aviation Organization. 1989.

International Law Association Committee on International Terrorism. "International Terrorism: Fourth Report of the Committee." *Terrorism* 7 (1984): 123.

Jacobson, H.K. *Networks of Interdependence.* New York: Knopf. 1984.

Jackson R. and E.E.A. Bromberg, *Development of a Portable Explosives Detection System* unpublished, undated article.

Jenkins, B.M. *International Terrorism: The Other World War.* Rand Paper R-3302-AF, 1985.

Jiwa, S. *The Death of Air India Flight 182.* London: W.H. Allen. 1986.

Johnston, D. *Lockerbie.* London: Bloomsbury. 1989.

Jönsson, C. *International Aviation and the Politics of Regime Change.* London: Pinter, 1987.

Joy, T.J.C. *Aviation Security (Management Aspects): Government National and Regulatory Viewpoint.* Unpublished paper presented at International Aviation Management Training Institute Conference on Aviation Law and its Impact on Management, Bali, Indonesia, 10 May 1990.

Joyner, N.D. *Aerial Hijacking as an International Crime.* Leyden: Siithoff, 1974.

Kapteyn, P.J.G. *et al. International Organization and Integration.* The Hague: Nijhoff, 1981.

Kaye, S.S. "The United Nations Effort to Draft a Convention on the Taking of Hostages." *The American University Law Review* 27 (1978): 433.

Kean, A.W.G., B Cheng and Sir F. Tymms. "The Latest on Hijacking." *Aeronautical Journal* 77 (1973): 338.

Klimak, R.F. "International Law - Convention on Offenses and Certain Other Acts Committed on Board Aircraft - The Tokyo Convention." *De Paul Law Review* 20 (1971): 485.

Knauth, A.W. "Crime in the High Air - A Footnote to History." *Tulane Law Review* 25 (1950-1): 446.

Knowles, G. *Bomb Security Guide.* Los Angeles: Security World Publishing, 1976.

Kotaite, A. "Security of International Civil Aviation - Role of ICAO." *Annals of Air and Space Law* 7 (1982): 95.

. "ICAO Policy and Programmes in the Field of Aviation Security." *Annals of Air and Space Law* 10 (1985): 83.

Kotowski, A. "A Review of Modern X-Ray Screening Devices." *ICAO Bulletin* 41 (October 1986): 22.

Kutner, L. "Constructive Notice: A Proposal to End International Terrorism." *New York Law Forum* 19 (1973): 325.

Laity, F.R.J. *Aviation Security (Management Aspects).* Unpublished paper presented at International Aviation Management Training Institute Conference on Aviation Law and its Impact on Management, Bali, Indonesia, 10 May 1990.

Lakos, A. *International Terrorism: A Bibliography.* Boulder, Colorado: Westview, 1986.

Lambert, J.J. *Terrorism and Hostages in International Law.* Cambridge: Grotius, 1990.

Laqueur, W. *Terrorism.* London: Weidenfeld and Nicolson, 1979.

Lewis, A. and M. Kaplan (eds.). *Terror in the Skies - Aviation Security.* Proceedings of the First International Seminar on Aviation Security. Jeusalem, Israel, February, 1989. Jerusalem: International Seminar on Aviation Security, 1990.

Loy, F.E. "Some International Approaches to Dealing with Hijacking of Aircraft." *International Lawyer* 4 (1970): 444.

Mallison, W.T. and S.V. Mallison. "The Concept of Public Purpose Terror in International Law: Doctrines and Sanctions to Reduce the Destruction of Human and Material Values." *Howard Law Journal* 18 (1973): 15.

McClintock, M.C. "Book Review." *Journal of Air Law and Commerce* 40 (1974): 147.

McGrane, R.J. "A Search for an International Solution to the Problem of Aircraft Hijacking." *Auckland University Law Review* 2 (1975): 83.

McGuire, F.G. "Explosive Detection Producing Explosive Controversy." *Airport Operations.* 15 (November/December 1989): 1.

McKeithen, R.L.S. "Prospects for the Prevention of Aircraft Hijacking Through Law." *Columbia Journal of Transnational Law* 9 (1970): 60.

MacKenzie-Orr, M.H. "Aviation Security in an Age of Terrorism." *Flight Safety Digest* December 1988: 1.

McNeil, M.S. "Aerial Hijacking and the Protection of Diplomats." *Harvard International Law Journal* 14 (1973): 595.

McWhinney, E. *The Freedom of the Air.* Leyden: Siithoff, 1968.

. *Aerial Piracy and International Law.* Leyden: Siithoff, 1971.

. *Aerial Piracy and International Terrorism.* Dordrecht: Nijhoff, 1987.

Menadue, J. "Aviation Safety and Security: Problems and Possible Solutions." *ICAO Bulletin* 42 (1987): 15.

Mendelsohn, A.I. "In-Flight Crime: The International and Domestic Picture under the Tokyo Convention." *Virginia Law Review* 53 (1967): 509.

Mendes de Leon, P.M.J. and T.L. Zwaan (eds.). *Aviation Security* (conference proceedings). Leyden: International Institute of Air and Space Law, 1987.

Milte, K.L. "Prevention of Terrorism Through the Development of Supra-national Criminology." *The Journal of International Law and Economics* 10 (1975): 519.

Moore, K.C. *Airport, Aircraft and Airline Security.* Los Angeles: Security World Publishing Co., 1976.

Morris, E. and A. Hoe with J. Potter. *Terrorism - Threat and Response.* London: Macmillan, 1987.

Murphy, E.E. "A Rising War on Terrorists." *IEEE Spectrum* November 1989: 33.

Murphy, J.F. *Punishing International Terrorists: The Legal Framework for Policy Initiatives.* Totowa: Rowman and Allanheld, 1985.

Nau, C.J. Jr. "The Antiskyjack System: A Matter of Search - or Seizure." *Notre Dame Lawyer* 48 (1973): 1261.

Nelms, D. "USA Plans Tighter Security." *Interavia Aerospace Review.* 7 (1989): 690.

Newham, D.F. "The Hague Convention on Hijacking of Aircraft 1970 - The Operational Angle." *Aeronautical Journal* 76 (1972): 535.

Newton, E. "Investigating Explosive Sabotage in Aircraft." *The International Journal of Aviation Safety* 1985: 43.

Norris, G. "Security Concerns Across the Atlantic." *Interavia Aerospace Review.* 7 (1989): 693.

Norton, G. "Tourism and International Terrorism." *The World Today* 43/2 (1987): 30.

Norton Moore, J. "A Few Thoughts on Fighting Terrorism." *Terrorism* 10 (1987): 41.

Norville, J.R. "Airports - Protecting the Airside." *Airport Technology International* (1988): 246.

November, C. "Aircraft Piracy: The Hague Hijacking Convention." *International Lawyer* 6 (1972): 642.

Oakley, R. "International Terrorism." *Foreign Affairs: America and the World.* 65 (1986): 611.

O'Ballance, E. *Languages of Violence: The Blood Politics of Terrorism.* Novato: Presidio, 1979.

. "Aviation and Airport Security." *Gulf Report* 2/21 (1989): 3.

. *Terrorism in the 1980s.* London: Arms and Armour Press. 1989.

O'Donnell, J.J. "Skyjacking: Problems and Potential Solutions - A Symposium - Air Crimes - Perspective from the Cockpit." *Villanova Law Review* 18 (1973): 988.

Paolillo, F.H. "Some General Reflections on the Acceptance of Treaties as a Means of Expanding the Body of International Law." *The Journal of International Law and Economics* 10 (1975): 355.

Pedersen, F.C. "Controlling International Terrorism: An Analysis of International Force and Proposals for Multilateral Cooperation." *Toledo Law Review* 8 (1976): 209.

Phipps, D. "Airport Security: Where Do We Go from Here?" *ICAO Bulletin* 36 (October 1981): 29.

Pierre, A.J. "The Politics of International Terrorism." *Orbis* 19 (1975): 1251.

Potter, A.M., P. Fotheringham and J.G. Kellas. *American Government and Politics* London: Faber and Faber, 1981.

Poulantzas, N.M. "Hijacking or Air Piracy?" *Nederlands Juristenblad* 20 (1970): 566.

Powell, W. *The Anarchist Cookbook.* New Jersey: Lyle Stuart, 1971.

President's Commission on Aviation Security and Terrorism. *Report of the President's Commission on Aviation Security and Terrorism.* (Washington D.C.: Government Printing Office, 1990).

Prosser, B. "Aviation Security Systems Have Grown to Match the Threat." *ICAO Bulletin* 40 (October 1985): 24.

Reeves, W.H. "Political Hijacking: What Law Applies in Peace and War." *Vanderbilt Law Review* 22 (1969): 1117.

Richard, G. "Airtransport Safety: Prevention and Sanctions." *Annals of Air and Space Law* 10 (1985): 209.

Robertson, G. and A.G.L. Nicol. *Media Law.* London: Sage, 1985.

Rosenfield, S.B. "Air Piracy: Is it Time to Relax our Security?" *New England Law Review* 9 (1973): 81.

Rowling, W. "New Zealand's Response to Terrorism: A Perspective." *Terrorism* 10 (1987): 37.

Samuels, A. "The Legal Problems: An Introduction." *Journal of Air Law and Commerce* 37 (1971): 163.

Sandbu M.D. and P. Nordbeck (eds.). *International Terrorism.* Report from a Seminar Arranged by The European Law Students' Association in Lund, Sweden. 1 - 3 October 1987. Lund: Juristförlaget i Lund, 1989.

Sassella, M. "The International Civil Aviation Organization: Its Contribution to International Law." *Melbourne University Law Review* 8 (1971): 41.

Sater, W. "The Terrorist Threat to Travellers." *TVI Report* 6(4) (1986): 19.

Schmid, A.P. *Political Terrorism: A Research Guide to Concepts, Theories, Data Bases and Literature.* Amsterdam: North-Holland Publishing Co., 1983.

and A.J. Jongman. *Political Terrorism: A New Guide to Actors, Authors, Concepts, Data Bases, Theories and Literature.* Amsterdam: SWIDOC, 1988.

Schwarzenburger, G. "International *Jus Cogens?*" *Texas Law Review* 43 (1965): 455.

and E.D. Brown. *A Manual of International Law.* London: Milton, 1976.

Schwenk, W. "The Bonn Declaration on Hijacking." *Annals of Air and Space Law* 4 (1980): 317.

Segaller, S. *Invisible Armies.* London: Sphere, 1987.

Sharp, J.M. "Canada and the Hijacking of Aircraft." *Manitoba Law Journal* 5 (1973): 451.

Shearer, I.A. *Extradition in International Law.* Manchester: Manchester University Press, 1971.

Shubber, S. "Is Hijacking of Aircraft Piracy in International Law?" *British Yearbook of International Law* 43 (1968-9): 193.

. "Aircraft Hijacking under the Hague Convention 1970 - A New Regime?" *International and Comparative Law Quarterly* 22 (1973): 725.

. *Jurisdiction Over Crimes on Board Aircraft.* The Hague: Martinus Nijhoff, 1973.

Skelhorn, N. *Public Prosecutor.* London: Harrap, 1981.

Smart, P. St J. "The China Airlines Incident: Political Offenders and the Hague Convention 1970." *Air Law* 11 (1986): 258.

Smith, C.L. "The Probable Necessity of an International Prison in Solving Aircraft Hijacking." *International Lawyer* 5 (1971): 269.

Smith, G.D. *Military Options in Response to State-Sponsored Terrorism.* ISA/BISA Joint Conference paper, presented London, 31 March 1989.

Snow, P. and D. Phillips. *Leila's Hijack War.* London: Pan, 1970.

Sofaer, A.D. "The U.S.-U.K. Supplementary Extradition Treaty." *Terrorism* 8 (1986): 327.

Sponsler, T.H. "International Kidnapping." *International Lawyer* 5 (1971): 27.

Steelman, H. "International Terrorism vis-a-vis Air-Hijacking." *Southwestern University Law Review* 9 (1977): 85.

Steven, J.E. "Going South - Air Piracy and Unlawful Interference with Air Commerce." *International Lawyer* 4 (1970).

Stoffel, J. *Explosives and Homemade Bombs.* Springfield: Thomas, 1972.

Strentz, T. "Radical Right Terrorists vs. Radical Left Terrorists: Their Theory and Threat." *Flight Safety Digest* April 1990, p. 1.

Sundberg, J.W.F. "Piracy: Air and Sea." *De Paul Law Review* 20 (1971): 337.

. "Lawful and Unlawful Seizure of Aircraft." *Terrorism: An International Journal* 1 (1978): 423.

Szekely, T. "Airport Security: An Automated and Integrated System." *Airport Technology International* (1989): 183.

Taulbee, J.L. *Political Crimes, Human Rights and Contemporary International Practice.* ISA/BISA Joint Conference paper, presented London, March - April 1989.

Testrake, J. and D. Wimbish. *Triumph Over Terror on Flight 847.* Eastbourne: Kingsway, 1987.

Thexton, M. "The Hijacking of PA73: A Hostage's Account." *TVI Report* 8(3) (1989): 43.

Tompkins, T.C. "The Terrorist Arsenal - Part 2." *TVI Report* 6(4) (1986): 51.

Trelles, O.M. (II). "International Law and Aircraft Hijacking." *The New Zealand Law Journal* 4 April 1978: 118.

Troncoso Cortés, F.M. "Conventions on Unlawful Interference with Aircraft ("Pirateria Aeria") a Hard Line." *Revista del Colegio de Abogados de Puerto Rico* 34 (1973): 537.

Turabian, K.L. *A Manual for Writers of Term Papers, Theses, and Dissertations.* Chicago: University of Chicago Press, 1987.

Tymms, F. "The Hague Convention on Hijacking of Aircraft 1970 - Assessment of Measures, Legal and Physical to Fight Hijacking." *Aeronautical Journal* 76 (1972): 537.

Unconventional Warfare Devices and Techniques: Department of the Army Technical Manual TM 31-200-1. Washington D.C.: Department of the Army: 1966.

U.S. Department of State. *Patterns of Global Terrorism: 1988.* [Washington D.C.]: U.S. Department of State, March 1989.

U.S. Department of Transportation, Federal Aviation Administration. *Incidents Involving Civil Aviation, July 1973 - June 1974.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration, 1974.

. *Worldwide Criminal Acts Involving Civil Aviation, 1974 - 1975.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration, 1975 - 1976.

. *Significant Worldwide Criminal Acts Involving Civil Aviation. 1976 - 1978.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration. 1977 - 1979.

. *Worldwide Significant Criminal Acts Involving Civil Aviation. 1979 - 1985.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration, 1980 - 1986.

. *Aircraft Hijackings and Other Criminal Acts Against Civil Aviation, Statistical and Narrative Reports.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration, 1984 - 1987.

. *Semiannual Report to Congress on the Effectiveness of the Civil Aviation Security Program 1984 - 1987.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration. 1985 - 1988.

. *U.S. and Foreign Registered Aircraft Hijackings.* [Washington D.C.]: U.S. Department of Transportation. Federal Aviation Administration. 1986.

. *Criminal Acts Involving Civil Aviation.* [Washington D.C.]: U.S. Department of Transportation, Federal Aviation Administration, 1986 - 1988.

U.S. General Accounting Office. *Aviation Security: FAA Needs Preboard Passenger Performance Standards.* [Washington D.C.]: U.S. General Accounting Office, 1987.

. *Aviation Security: FAA Preboard Passenger Screening Results.* [Washington D.C.]: U.S. General Accounting Office. 1987.

Van Panhuys, H.F. "Aircraft Hijacking and International Law." *Columbia Journal of Transnational Law* 9 (1970): 1.

Vincent, B.H. *Statement by Mr. Billie H. Vincent Before a Subcommittee of the Committee on Government Operations, House of Representatives. September 25/26. 1989.* Submission to a Sub-Committee of the Committee on Government Operations. House of Representatives. Washington D.C.. 25 - 26 September 1989.

Visser, C.J. *Civil Aviation Remains Vulnerable to Terrorism.* Arlington: Flight Safety Foundation. 1988.

"What is the Role of a Consultant in Civil Aviation Development?" *ICAO Bulletin,* 44 (September 1989): 39.

Whitehead, J. *Counterterrorism Policy.* Washington D.C.: US Department of State. Current Policy No. 823. April 1986.

Whiteman, O.M. "*Jus Cogens* in International Law with a Projected List." *Georgia Journal of International and Comparative Law* 7 (1977) 609.

Wiingaert, C. Van den. *The Political Offence Exception to Extradition: The Delicate Problem of Balancing the Rights of the Individual and the International Public Order.* Deventer: Kluwer, 1980.

Wilberforce, R. "Crime in Aircraft." *Journal of the Royal Aeronautical Society* 67 (1963) 175.

Wilkinson, P. *Political Terrorism* London: Macmillan, 1974.

. *Terrorism and the Liberal State* London: Macmillan, 1986.

. "Designing Effective National Aviation Security Systems." *Airport Technology International* (1989): 176.

. *Designing Effective National Aviation Security Systems: The Building Blocks for an Enhanced Global Response.* ISA/BISA Joint Conference paper, presented London, 31 March 1989.

. "Aviation Terrorism and the Changing Threat." *Interavia Aerospace Review.* 7 (1989): 688.

. *The Lessons of Lockerbie.* London: Research Institute for the Study of Conflict and Terrorism, 1989.

. "Aviation Security in the 1990s - The Lessons of Lockerbie." *International Security Review.* January/February 1990: 22.

Wilson, J.R. "Why a Hint of Red Rings Alarm Bells." *Jane's Airport Review* June/July 1989: 16.

Wurfel, S.F. "Aircraft Piracy - Crime or Fun?" *William and Mary Law Review* 10 (1969): 820.

Yeffet, I. Untitled Submission to a Sub-Committee of the Committee on Government Operations, House of Representatives, Washington D.C., 25 September 1989.

and E. Barnes. "No Airport in the U.S. is Safe." *Life.* March 1989: 132.

Secondary Sources

ICAO Working Papers and Documents:
A26 - WP/41 EX/9 ADDENDUM NO. 4 29/9/86.

A26-WP/53 EX/12 26/8/86.

A26-WP/75 EX/15 22/9/86.

A26-WP/157 P/79 6/10/86

A26-WP/161 P/82 6/10/86

LE 3/32-86/102 26/11/86.

A27-WP/64 EX/19 12/7/89.

LC/27-WP/3, 22/1/90.

LC/SC-MEX-REPORT, 19/1/90.

Daily and Weekly Newspapers and News Journals:

Arab News

Life

Lloyds' List

Newsweek

Soviet Weekly (photocopy)

Time

The Boston Globe (reprint)

The Boston Herald (reprint)

The Christian Science Monitor

The Daily Mail

The Daily Telegraph

The Economist

The Financial Times

The German Tribune

The Glasgow Herald

The Guardian

The Independent

The International Herald Tribune

The Observer

The Scotsman

The Sunday Telegraph

The Sunday Times

The Times

The Wall Street Journal

USA Today

Other Periodicals:

Air Travel Journal

Airports International

Airport Support

Aviation Week and Space Technology

Condé Nast Traveler

Discover

Flight International

ILO Information

International Security Review

International Legal Materials

Jane's Airport Review

New Scientist

Plane Facts

Popular Science

Science (reprint)

Security Management Today

Travel Weekly

Press Releases and Publicity Material:

British Airways World Timetable. 29 October 1989 - 24 March 1990

El Al Winter Timetable, 1989/90

Press Release from the Department of Transport

Press Release from ICAO

Press Release from IFAPA

Press Release from Novosti Press Agency

Press Release from Representative Mario Biaggi

Publicity material for A.I. Security

Publicity material for AS&E

Publicity material for Astrophysics

Publicity material for Contemporary Systems Design

Publicity material for Graseby Security

Publicity material for Heimann

Publicity material for Joint Airports Committee of Local Authorities

Publicity material for SAIC

Publicity material for Thermedics

Broadcast and News Agency Information:

Associated Press Cable

BBC, Breakfast Time

BBC, Early Evening News

BBC, Kilroy

BBC, Newsnight

BBC, One O'Clock News

BBC Radio 1, Newsbeat

BBC Radio 4, Call Nick Ross

BBC Radio 4, The World at One

BBC, Six O'Clock News

Channel 4, Dispatches

ITN, Afternoon News

ITN, Early Evening News

ITN, Channel 4 News

ITN, News at Ten

ITV, TV Eye

Interviews:

Informal interview with British intelligence consultant. Geneva, Switzerland, February 1987.

Informal interview with West German aviation security expert. Paris, France, June 1990.

Interview with British airport design specialist and IOCU representative to ECAC Working Group on Security Matters. John Loder, Paris, France, September 1989.

Interview with British aviation security expert. Aberdeen. UK. March 1989.

Interview with British aviation security expert. Paris. France. June 1990.

Interview with Canadian security expert, London. UK. 1 April 1989.

Interview with civil servant. Paris. France. 6 June 1990.

Interview with ICAO security team member. Paris. France. September 1989.

Interview with Scottish aviation security expert. Paris. France. June 1990.

Interviews with Richard Myers. freelance journalist specialising in conflict and security, Glasgow, UK, 21 and 25 November 1989.

Conference Papers and Lectures:

Dorey, F.C. Untitled conference paper at "Scotsec '87" conference. Renfrew: unpublished. 11 November 1987.

Lipman, G., *Megatrends in Aviation.* seminar paper (unpublished) presented at University of Aberdeen, 26 January 1989.

Wallis R., *Beaumont Memorial Lecture.* Royal Aeronautical Society, London. UK, 18 October 1989.